



Methodology and results for the assessment of oil and gas resources, National Petroleum Reserve, Alaska

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ABSTRACT

Oil and gas resources in each of the 24 plays within the National Petroleum Reserve in Alaska (NPRA) were estimated using a play analysis. Assessors specified geologic attributes, risks, and number of prospects for each play. Some specifications established distributions, while others were given as single values. From this information, sizes of oil and gas accumulations were simulated using a Monte Carlo algorithm. The number of such accumulations considered in a given simulation run was obtained from the distribution of the number of prospects. Each prospect in each successful simulation run was risked. This process yielded size-frequency distributions and summary statistics for the various petroleum categories. Estimates of remaining resources from individual plays were then aggregated, and measures of uncertainty computed. Technically recoverable, undiscovered oil beneath the Federal part of NPRA likely ranges between 5.9 and 13.2 billion barrels, with a mean (expected) value of 9.3 billion barrels. Technically recoverable, undiscovered nonassociated natural gas for the same area likely ranges between 39.1 and 83.2 trillion cubic feet, with a mean (expected) value of 59.7 trillion cubic feet. Mean values of the corresponding associated dissolved gas and natural gas liquid are 10.3 trillion cubic feet and 1.4 billion barrels respectively.

INTRODUCTION

There are two commonly used methodologies for assessing undiscovered oil and gas in geologic plays. One is discovery process modeling, a statistical-geological modeling procedure, which is used in more mature areas (Drew, Schuenemeyer, and Mast, 1995). A mature area is one that has a sufficient number of exploratory and discovery wells to ensure a degree of statistical regularity in an analysis. The other is subjective probability and risking, which is commonly used in frontier areas. Because there were relatively few discoveries in NPRA, the latter procedure was used in this assessment. In subjective probability assessments, experts specify input values for various parameters. In this assessment a Monte Carlo simulation algorithm was used to generate estimates of undiscovered resources.

The NPRA assessment was performed at the play level. For each play, assessors specified distributions needed to generate accumulations of oil and gas, and a distribution of the number of prospects expected to occur. They also specified risk factors. The methodology used in this assessment was a

modified version of the methodology used in the U.S. Geological Survey's 1998 assessment of the 1002 Area of the Arctic National Wildlife Refuge (ANWR) (Schuenemeyer, 1999). Improvements included modifications to the input form, fitting beta distributions to specified fractiles, and new petroleum engineering models. Minimum reservoir sizes for oil and for gas were established to facilitate estimation of the number of prospects. Approximate deposit size distributions were generated at the mean, median, and 5th and 95th levels of uncertainty. Play resources were allocated to Federal land based on estimated proportions of oil and gas resources.

Estimates of remaining resources from individual plays were aggregated into distributions of remaining resources for the total NPRA land area and for a subset, the Federal land area. The aggregation procedures also were modified from those used in the 1002-ANWR assessment.

This chapter begins with a discussion of the geologic and engineering input, which was specified by the assessors for each play and entered on the assessment form. Following this, the Monte Carlo simulation is presented. We conclude with a discussion of the aggregation procedure.

After presentation of the methodology, results will be summarized for each play and for the aggregate total of oil and nonassociated gas and various derivatives. Detailed discussion of the results is presented elsewhere on this Web site. Definition of terms is given in the Glossary.

SPECIFICATION OF THE INPUT

Information used by the assessment algorithm consisted of statistical models with parameters and assessor-specified distributions and constants. An assessment form, which was a modified version of that used in the 1998 1002-ANWR assessment, was used to capture the distributions and constants for each play. The input for oil, gas, and number of prospects and risk was specified on three Excel¹ worksheets. The first worksheet (Table 1a) provided for the entry of hydrocarbon volume parameters for oil, the trap depth distribution, and oil accumulation characteristics. The second worksheet (Table 1b) provided for similar information for nonassociated gas. The third worksheet (Table 1c) was for the specification of the number

¹ Mention of a brand name is provided for clarification and does not constitute an endorsement by the U.S. Geological Survey or the author.

of prospects, risking information, the proportional allocation of deposits between oil and gas, and the proportional land allocation. Many of the entries on the form are self-explanatory. Those that are not or those of special importance will be discussed here. Information provided by assessors in tables 1a, 1b, and 1c served as input to a series of Splus, v.6.0 (Insightful Corp., Seattle, WA) programs used to estimate resultant volumes of undiscovered resources. (Splus is a commercially available statistical computing package and programming language, which is functional in form and can be translated into other high level languages.) General instructions for completing these forms were provide to each assessor (Table 1d). In addition to specifying fractiles of a distribution, assessors were asked to specify its shape, which could range from highly right skewed to highly left skewed (Table 1e). This procedure served as a check on the specification of fractiles.

In order to avoid the considerable uncertainties associated with assessing a potentially large number of small prospects, which would be neither technically recoverable nor commercially viable in the foreseeable future, a minimum reservoir size or cutoff value was established for oil and gas. For oil, only deposits of at least 50 MMBO in place were considered (Table 1c). For gas, only deposits of at least 250 BCF technically recoverable were considered. Because of differences in volumetric and expansion properties of oil and gas, separate minimum reservoir sizes were used. This issue is discussed in more detail in a subsequent subsection on minimum size accumulations.

Oil Parameters

Assessors specified distributions for the following oil hydrocarbon volume parameters (Table 1a):

- net reservoir thickness, *NRT*, in feet,
- area of closure, *AC*, in thousands of acres,
- porosity, *POR*, in percent,
- trap fill, *TF* in percent, and
- trap depth, *TD* in thousands of feet.

Estimates of the lower truncation point (LTP), the 50th (F50), and 5th (F05) fractiles, and the maximum value were entered for *NRT*, *AC*, *POR*, and *TF*.

The hydrocarbon pore volume (*HPV*) in percent was computed as

$$HPV = POR - BVW$$

where *BVW*, the bulk volume water, is defined as the product of *POR* and water saturation S_w ($BVW = POR * S_w$). That is, *BVW* is the fraction or percentage of rock volume, which is filled with water. (The analysis and discussion of *HPV* is based upon written communication from Philip Nelson, U.S. Geological Survey.) The question we faced was, what fraction of the rock volume is filled with water (the *BVW*) and how much with hydrocarbon (called *hydrocarbon pore volume* or *HPV*)? These two values, given either as a percentage or as a fraction, must sum to the porosity, such that $BVW + HPV = POR$. The porosity distribution is determined by the assessor from available core data, well logs, and analog fields. Because *BVW* is the product of porosity and water saturation, the problem of determining *BVW* reduces to the estimation of water saturation. In this assessment we adopted the same assumption used in the assessment of the Arctic National Wildlife Refuge (Nelson, 1999): that *BVW* is constant in a given field. That assumption rests on the concept that *BVW* is constant within a specified lithology above the water-hydrocarbon transition zone and implies that water saturation varies inversely with porosity. The oil and gas parameter assessment sheets (Table 1a and Table 1b, respectively) show the assignment of *BVW* (called $POR * S_w$ on the form) as the rightmost entry on the row labeled *HYDROCARBON PORE VOLUME* on the Oil and Gas worksheets. The value of *BVW* is treated as a constant, which is then subtracted from the porosity distribution to yield the distribution of hydrocarbon pore volume. For example, in the northeast Beaufortian Upper Jurassic Topset Play, *BVW* is 4 percent, the median porosity is 17 percent, and consequently the median hydrocarbon pore volume is 13 percent. *BVW* was between 1 and 6 for the assessed NPRA plays.

Values of LTP were chosen so that the oil in place (*OIP*) generated at these points would be approximately 50 MMBO. It was assumed that for *NRT*, *AC*, *POR*, and *TF* the population minimum was zero. (Note that LTP does not represent a specific fractile common to all attributes in a given play.) This information established guidelines concerning the values of *NRT*, *TF*, and the other parameters that “on average” constituted a 50 MMBO in-place oil accumulation. Then assessors were given plots showing the shape of each histogram of the hydrocarbon volume parameters. Assessors modified their initial distributions, as necessary, so that the minimum accumulation size generated from these distributions would be within an order of magnitude of the cutoff.

For TD and number of prospects (Table 1c) the LTP is the minimum value of the population distribution. The TD was adjusted before use in the model by adding average surface elevation (Table 1a).

The oil accumulation volume parameter distributions were intended to show the variation in characteristics of prospects across a play and not variation within a given prospect. The values chosen for the fractiles and other estimates were based upon field studies, geophysical and geochemical data, well logs, and analogy. Specific justifications are given in individual play description chapters.

Samples from these oil volume distributions and an estimate of the formation volume factor (FVF_o) in reservoir barrels/stock tank barrels, rb/stb were combined to estimate OIP (in millions of barrels, MMBO), as:

$$OIP = 7.758 \times NRT \times AC \times HPV \times TF \times 10^4 / FVF_o$$

An estimate of FVF_o , developed by Mahendra Verma, U.S. Geological Survey, (written communication and Reservoir Engineering Aspects chapter) is computed as follows. Let $p = 1000TD / 2$ and $t = 19TD + 30$ where p is pressure in pounds per square inch (psi) and t is temperature in degrees F. Then the solution specific gravity, sgg is

$$sgg = ((0.1402 \ln(p + 14.7) - 0.4227) + (0.1369 \ln(t) + 0.0156) + (0.1704 \ln(ag) + 0.1469)) / 3$$

where ag is API gravity as specified on the oil worksheet play form (Table 1a) and “ln” in the above equation is log base e function. The associated gas to oil ratio GOR (cu. ft. per barrel at stp) is

$$GOR_u = sgg \left[\frac{(p + 14.7) 10^{0.0125ag}}{18 \times 10^{0.00091t}} \right]^{1/0.83}.$$

Then

$$og = 141.5 / (ag + 131.5)$$

$$F = GOR(sgg / og)^{0.5} + 1.25t'$$

where og is oil gravity.

Finally

$$FVF_o = 0.972 + 0.000147 F^{1.175}.$$

Oil FVF 's are shown for the minimum, medium, and maximum API gravities in NPRA (Fig. ME1).

Gas parameters

The type of gas hydrocarbon volume attributes and characteristics, Table ME1b, which were used to compute the accumulation sizes of gas, are the same as for oil, namely NRT , AC , POR , TF , and TD . The fractile values specified for these attributes, however, sometimes differed from those for oil. A different algorithm was used to estimate the gas formation volume factor FVF_g .

The equation for the accumulation size of gas in place, GIP , (in billions of cubic feet, BCF) is:

$$GIP = 4.356 \times NRT \times AC \times HPV \times TF \times 10^{-6} \times FVF_g$$

The FVF_g was derived from a curve fit model based upon results derived by Mahendra Verma, U.S. Geological Survey, (written communication and Reservoir Engineering Aspects chapter) using the theory of Corresponding States:

$$FVF_g = \frac{35.37415(p+14.7)}{(t+460)z}$$

where z is the gas compressibility factor. Because z is nonlinear, we chose to fit the computed FVF_g versus depth. The piecewise curve fitted model is:

$$FVF_g \approx \begin{cases} 752.2(1 - e^{-0.05728TD}) & 0 < TD \leq 5.67 \\ 113.3 + 21.1TD - 0.812TD^2 + 0.0116TD^3 & 5.67 < TD \leq 30 \end{cases}$$

where TD is trap depth in thousands of feet. The form of the model is illustrated in Figure 2.

Correlated attributes

The formulas for oil and gas accumulations *OIP* and *GIP* given in the previous section imply pairwise independence between all of the attributes. In some instances assessors chose to specify negative correlations between *NRT* and *AC* and between *NRT* and *HPV*. To incorporate these correlation structures into the accumulation formulas, we used the following procedure:

1. Let R be a matrix whose elements are the assessor specified pairwise correlations. We assume R to be a 3×3 matrix. Also, let $ns = 10,000$, where ns is the number of simulation runs.
2. We then see if R is permissible. A permissible matrix is one whose determinant is greater than or equal to zero. All assessor defined correlations resulted in permissible matrices. (See additional discussion in the section on Aggregation Methodology.)
3. If R is permissible, let $Ch = \text{Cholesky}(R)$, be the Cholesky factorization of R .
4. Let U_a be a $ns \times 3$ matrix, where each row of U_a is an independent set of uniform random numbers between -1 and 1 .
5. Let $U_{ac} = U_a \times R$.
6. Let $U_r[i] = \text{Rank}(U_{ac}[i])$, $i=1,2,3$
7. The ranked values in the columns of U_r then represent the sample numbers of the accumulations (with accumulations sorted in ascending order) necessary to achieve the desired correlation.

Risking

Risk in the context of this study is the probability that a play or prospect would be unsuccessful because of the failure of one or more geologic attributes necessary to achieve success. Because it is natural to think of the likelihood of an attribute being present, we used the complement of risk, namely favorability. Thus, a favorability of one implies zero risk.

There are two favorability structures. One is play; the other is prospect. Prospect favorability was sometimes further subdivided into oil and gas. Each of these is the product of three attributes, however, play favorability refers to the product of attributes needed for a successful play, whereas, prospect probability refers to the product of those attributes associated with a randomly chosen prospect. The attributes that constitute these structures are

charge, trap, and timing formation (Table 1c). Although the names of the attributes are the same at the play and prospect levels, there are six distinct attributes (or nine if separate oil and gas prospect favorability probabilities are specified). They are assumed to be pairwise independent of each other. Prospect attributes were assessed conditional upon the play being successful.

A successful play is one in which all three of the play level attributes necessary for a prospect of at least 50 MMBO in-place oil or 250 BCF of technically recoverable nonassociated gas are present. However, there is no guarantee that such a prospect will be found in a “successful play”. A failure to find at least one deposit in a “successful play” can occur when few prospects are specified and/or the prospect favorability is low. Given a successful play, the number of prospects was drawn at random from the distribution of prospects specified in Table ME1c. The prospect favorability was then applied to each of these prospects. The mechanism to do this was to generate a [0,1] continuous uniform pseudo-random number for each prospect selected. When the value of the random number did not exceed the prospect favorability, we accepted the prospect and relabeled it a deposit. Thus, the deposits generated in such a manner reflect an unconditional distribution, the risks associated with play and prospect having been applied. Assessment definitions were established and made available to the assessors to provide specific guidelines to allow them to differentiate between these two risks.

Minimum size accumulations

For oil, only prospects of at least 50 MMBO in place (at the surface) were considered. For gas, only prospects of at least 250 BCF technically recoverable (at the surface) were considered. There are several reasons for the choice of a cutoff value. Resources in most small fields will not be technically recoverable and/or economic in the foreseeable future. Although the amount of the resource contribution of very small fields is dependent upon the population distribution of oil and/or gas fields, it is unlikely that they will contribute substantially to the NPRA resource base in the foreseeable future. In addition, there are technical reasons for specifying a cutoff. It is difficult to estimate the potentially large number of small fields with any degree of accuracy due to the coarse seismic grid (approximately 3 mi. x 6 mi.) in NPRA and lack of significant exploratory drilling. We did allow, however, for fields, which are now marginally economic to be considered if the price/cost ratio becomes more favorable.

The reason for the choice of 50 MMBO for oil was two fold. First, members of the assessment team believe that the overwhelming majority of fields containing less than 50 MMBO in place, were not likely to technically recoverable and/or of economic interest in the foreseeable future. Second, a choice of a 50 MMBO cutoff was consistent with that used in the ANWR assessment Schuenemeyer (1999). The LTP's for the oil hydrocarbon attributes were chosen in part to yield an in-place accumulation of approximately 50 MMBO. For nonassociated gas, we diverted slightly from the procedure used in the ANWR assessment. In this assessment, a choice was made of a 250 BCF technically recoverable cutoff. Note that 300 BCF in-place nonassociated gas at the surface is the approximate energy equivalent of 50 MMBO, however, because of the expansive properties of gas, the equivalent oil to gas container size might not be appropriate. We saw previously that FVF_g varies widely, say from 42 for a depth of 1,000 feet to 329 for a depth of 30,000 ft. (See M. Verma, Reservoir Engineering Aspects chapter for specific details on gas attributes.) Thus, the 250 BCF cutoff value was chosen as a guide to allow specification of geologically reasonable containers in such a manner most consistent with the knowledge base of the assessors. However, nonassociated gas accumulations resulting from the specification of the LTP's varied more widely from the cutoff value than those for oil.

This distribution (Table 1c) was specified in the same manner as the distributions for trap depth and hydrocarbon volume. As with trap depth, the LTP is an estimate of the minimum value of the population. From this distribution, the number of oil prospects equal to or greater than 50 MMBO in place (and/or the number of nonassociated gas prospects equal to or greater than 250 BCF recoverable) was determined given a favorable play. If the probability of a favorable prospect is less than one, then the expected number of deposits will be less than the expected number of prospects.

THE PLAY SIMULATION

The methodology was based upon a Monte Carlo simulation. A series of functions, written in Splus6.0 and listed in appendix MEA, were used to implement the simulation. Results were stored in Excel spreadsheets. For each play, 10,000 simulations were run, conditioned on the play being favorable. For example, if the play probability was 0.80, as in the Ellesmerian Structural Play (Table 22), then the expected total number of

runs would be 10,000 divided by 0.80 or 12,500. However, since the expected number of unsuccessful runs was 2,500, we chose to run only the 10,000 potentially successful runs. The reason for choosing to run 10,000 simulations conditioned on a successful play was to obtain similar levels of precision on the summary statistics for all plays, even those that were highly risked. The uniform random number generator used for the simulations is an Splus.0 function called `runif`.

Input from tables 1a, 1b, and 1c was transferred to an Excel play form worksheet (not shown) and taken in to Splus6.0 using functions `OGIn.fn` and `OGdata.fn`.

All sampling occurred from the standard two-parameter beta distribution shown below

$$f(x; u, v) = B(u, v) x^u (1 - x)^v \quad 0 \leq x \leq 1$$

or a modified beta distributions, which were fit to the specified fractiles (function `OGpare.fn`). The method of fit was the Splus nonlinear estimation function `nlmin`, which uses a general quasi-Newton optimizer. The function being minimized (`fmin`) was

$$(qbeta(0.50, p[1], p[2]) - co[1])^2 + (qbeta(0.95, p[1], p[2]) - co[2])^2$$

where `qbeta` is the Splus beta quantile function, `p[1]` and `p[2]` are initial estimates of the beta distribution parameters established from the user specified distribution shape (Table 1e), and `c[1]` and `c[2]` are the standardized (to 0 to 1) values of the 0.50 (F50 fractile) and 0.95 (F05 fractile) percentiles specified by the assessors. The result is the estimated parameters of the beta distribution. The use of a modified beta distribution only occurred in a few instances for the distribution of trap fill where an assessor specified a) an inverted j-shaped distribution with 0.50 probability occurring at the maximum value (Table 1e, shape 7), or b) an inverted j-shaped distribution with 0.05 probability occurring at the maximum value (Table 1e, shape 8). In case a) the fitted beta density function was

$$f(x; 5, 1) = \begin{cases} 0.5beta(x; 5, 1), & 0 \leq x < 1 \\ 0.5 & x = 1 \end{cases}$$

In case b) the fitted beta distribution was

$$f(x;1,v) = \begin{cases} 0.95\text{beta}(x;1,v), & 0 \leq x < 1 \\ 0.05 & x = 1 \end{cases}$$

where $v = \ln(0.5) / \ln(1 - x_{0.95})$. Assessors were given the option of choosing other distributions if they did not feel these provided an adequate fit, however, none did.

Figure 3 is a flow chart for the simulation algorithm (function OGRa.fn). It begins with the big simulation loop, which was executed 10,000 times for each play; recall that 10,000 is the expected number of potentially favorable plays. Next, a sample was taken from the number of prospects distribution. This is a distribution conditioned on the volume of oil being at least 50 MMBO in-place or nonassociated gas being 250 BCF technically recoverable. Each prospect was randomly classified as oil or gas according to fraction oil specified by the assessor (Table 1c). The oil or gas prospect probability was then applied (Table 1c). For a successful prospect, now relabeled a deposit, the appropriate hydrocarbon volume parameters and depth were sampled and an in-place oil or technically recoverable nonassociated gas accumulation greater than the minimum reservoir size was computed. Associated-dissolved gas and natural gas liquids (NGL) from associated-dissolved gas and from nonassociated gas were also computed (Table 2). Technically recoverable quantities of oil were computed by multiplying the in-place volumes by the oil recovery factor (Tables 1a). In-place quantities of gas were computed by dividing the technically recoverable volumes by the gas recovery factor (Table 1b). Detailed information about the deposits for each play run was summarized (function OGDepSum.fn). After 10,000 simulations, summary statistics for the play were computed (function OGPS.fn) and are presented in the Results Excel spreadsheet. In addition, size-frequency distributions for in-place and recoverable oil and nonassociated gas were computed (functions OGshist.fn and OGsfreq.fn) and are presented in a Size-Freq Excel spreadsheet.

AGGREGATION METHODOLOGY

Overview

Resource estimates from individual plays were aggregated to total Federal land and total land in NPRA. An aggregate distribution was constructed by

sampling from the individual plays in a manner so as to estimate assessor specified dependencies between plays. Such dependencies may result from shared sources of charge, trap or timing. The basic concern in aggregating results is the effect that dependency has upon the spread of the aggregate distribution and thus on estimates of uncertainty. Failure to account for positive dependency would have resulted in estimates of uncertainty that were too narrow and thus would have created a higher level of confidence in results than would be warranted if the correct measure of dependency were used. Dependency does not affect the mean of the aggregate distribution, only the spread. The mean of the aggregate is simply the sum of the means of the plays to be aggregated.

The basic procedure used was to create a correlation matrix from assessor-specified dependencies, generate observations that have the specified correlation structure, rank the correlations, and then choose the samples to form an aggregate distribution. The 24 plays assessed in this NPRA assessment area are listed in Table ME3 and the corresponding expected number of total runs (including plays expected to be unsuccessful).

Specifying the Dependency

Assessors considered all possible pairs of the 24 plays being assessed. For each pair they assigned one of three values (low, medium or high) to the attributes of charge, trap, and timing (Tables 4). A high (positive) value assigned to charge between, say plays 1 and 2 might indicate a common mechanism charged both plays. Thus if the value of charge in play 1 was found to be high, the values of charge in play 2 would most likely be high. The three dependencies (charge, trap, and timing) were converted to correlations by assigning values of 0.1, 0.5, and 0.9 respectively to low, medium, and high entries. A single correlation matrix (Table 5) was then formed by taking the arithmetic average of the three correlation matrices. Negative dependencies were allowed, however, none were specified by the assessors.

There is a potential inconsistency associated with specifying correlations by pairs of plays, namely, some correlations impose restrictions on others. For example, suppose the correlation between plays A and B is 0.367 and that between plays A and C is 0.500. Then range of correlation between plays B and C is restricted in that not all values between -1 and $+1$ are permissible. In order to see if the 24 x 24 computed correlation matrix (Table 5) was

permissible, a statistical procedure called eigenvalue analysis was performed. The minimum eigenvalue of a permissible correlation matrix would be equal to or greater than zero. The minimum eigenvalue of this matrix (Table 5) is -0.211 . Thus, a slight biasing factor, 0.212 , was applied to each of the 24 eigenvalues (function OGcorr.fn). Then the correlation matrix was reconstructed. The resultant correlation matrix, which was used for the remaining part of the analysis, is given in Table 6. This procedure is similar to that used in the 1998 ANWR assessment (Schuenemeyer, J.H., 1999b). It is also virtually identical to the dependency scheme used in the USGS 1996 National Assessment (Gautier and other, 1995).

Generating a Correlated Sample

The adjusted correlation matrix (Table 6) was then used to induce the appropriate correlation structure in the data. A justification for this procedure was given previously. The algorithm is essentially the same as that used to generate correlated samples of hydrocarbon volume attributes. The procedure is outlined below.

1. Let R be the 24×24 adjusted (permissible) correlation matrix of play dependencies. Also, let $ns = 10,000$, where ns is the number of simulation runs.
2. Perform a Cholesky factorization on R to obtain a lower triangular matrix plus the diagonal matrix, call this A , such that $AA' = R$ (where A' is the transpose of A).
3. Let U_a be an $ns \times 24$ matrix, where each row of U_a is an independent set of continuous uniform random numbers between -1 and 1 .
4. Let $U_{ac} = U_a \times R$.
5. Let $U_r[i] = \text{Rank}(U_{ac}[i])$, $i=1, \dots, 24$.
6. Adjust the ranked matrix U_r by the total number of plays run ($10,000/\text{play probability}$).
7. The ranked values in the columns of U_r then represent the sample numbers of the play (with play recoverable barrels of oil equivalent sorted in ascending order) necessary to achieve the desired correlation.

Each element in the matrix U_r became a sample number. As previously discussed, only the expected number of successful plays was generated; however, sample numbers from unsuccessful plays were needed to generate samples for the aggregate distributions. For example, as previously noted,

Ellesmerian Structural Play has 12,500 total expected number of runs, however, only 10,000 simulation runs were made. In sampling for aggregation, we take a simple random sample of 10,000 from a population of 12,500 runs, 2,500 of which were a priori unsuccessful. For those plays that consisted of 10,000 runs (i.e., the play probability was 1.0), such as the Brookian Topset Play, this procedure generated a permutation of the original data that imparted the appropriate correlation structure. A rank correlation structure was used because the oil and gas distributions differ widely among the 24 plays. The standard (Pearson) correlation coefficient is only meaningful when distributions are similar and in particular when they are symmetric. The sample numbers were generated by function OGcorr.fn.

The actual process of aggregation, performed by algorithm OGagg.fn, was straightforward. Samples were selected by row from matrix Ur and the corresponding values of oil or gas were obtained from the appropriate play and/or prospect file. There were 10,000 simulation runs in each of the play/prospect files. The unsuccessful runs resulting from a favorable play probability less than one were assumed to follow the actual 10,000 runs generated from the simulation for purposes of sampling. The sums at the desired levels of aggregation were written to a file. The aggregation procedure was repeated 10 times with different random samples (algorithm OGcorr.fn) from the play dependency correlation matrix to minimize the sensitivity of results to a particular sample. Ten aggregation runs were chosen because, for example, the mean of F05 for in-place oil was 54752 and the corresponding standard error was 84, which is well within the precision limits for the assessment. The 10 aggregation runs were merged (Splus6.0 function rbind) resulting a total of 100,000 plays.

The estimates of uncertainty at the aggregate level were performed by function OGsummary.fn from the merged results. Summary results included the mean, standard deviation, and F95, F50, and F05 fractiles for in-place and recoverable oil and nonassociated gas for Federal and total lands.

For purposes of economic analysis it was desired to obtain and estimate of the field size distributions at each of the fractiles. To accomplish this and reduce sensitivity to the choice of a single fractile, the actual observation at the F95, F50, and F05 fractiles plus 10 observations on either side of this value were extracted and provided to Emil Attanasi, (Economics of Undiscovered Oil in Federal Lands in the NPRA chapter) for economic analysis.

RESULTS

An overview of result is given by Bird (Overview, chapter) and Bird and Houseknech (2002). Detailed discussions of play results are incorporated in chapters by individual assessors. Table R1 references detailed play results and aggregate summaries.

Individual play results are presented in tables 7 through 30. As an illustration we discuss the Brookian Topset Play results (table 7). This form contains the following worksheets:

- Oil (Table 7a)
- Gas (Table 7b)
- Play-prospect (Table 7c)
- Distn_O (Table 7d)
- Distn_G (Table 7d)
- Results (Table 7e)
- Size_Freq (Table 7f)

The first three of these worksheets (oil, gas, and play-prospect) are for the specification of input values and have been discussed in the methodology section. The next two (distn_O and distn_G) show the distribution of the fitted oil and gas hydrocarbon volume attributes, plus, trap depth and number of prospects. Sometimes these results are presented in a single sheet called distn. The results sheet shows density curves for unrisksed oil and/or gas accumulation distributions and risksed recoverable oil and/or gas for the play. The numerical results (table 7e, Results worksheet) show means, standard deviations, F95, F50, and F05 fractiles for in-place oil and nonassociated gas, and recoverable oil and gas and derivatives. The size frequency (table 7f, Size_freq worksheet) shows the distribution of number of deposits by size class and the distribution of recoverable oil and/or gas by size class.

Tables 31 and 32 show means by play for in-place and technically recoverable resources respectively. Means are presented for total and Federal land resources, comprising oil, nonassociated gas, associated dissolved gas (ADG) and natural gas liquids from ADG (NGL(adg)) and from nonassociated gas (NGL(nag)).

Table 33 presents means, F95, F50, and F05 fractiles for the aggregate summary of all plays for in-place and technically recoverable oil and nonassociated gas in the total assessed area and in Federal lands. Means of the aggregated totals are given for NGL and ADG.

REFERENCES

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- Drew, L.J., Schuenemeyer, J.H., and Mast, R.F., 1995, Application of the modified Arps-Roberts discovery process model to the 1995 U.S. National Oil and Gas Assessment: Nonrenewable Resources, v. 4, p. 242-252.
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- Schuenemeyer, J.H., 1999a, Assessment results, in the oil and gas resource potential of the 1002 Area, Arctic National Wildlife Refuge, Alaska, U.S. Geological Survey Open File Report 98-34, CDROM.
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Appendix A. Brief description of Splus functions used in the NPRA resource assessment

The programs are listed in the order they are to be used. Code for each program is available as text files elsewhere on this web site.

OGIn.fn

Calls OGdata.fn

Input:

play names file (AllocPR)

Output:

Basic Splus data files, xxdata, where xx is play name prefix

OGdata.fn

Gets data from Excel playwork worksheets

Input:

Excel play file name (from AllocPR)

Sheet sequence number of play worksheet (from AllocPR)

OGpare.fn

Fits beta distributions to oil/gas play attributes and generates distribution plots. This function calls fmin the minimization function.

Input:

Play name & xxdata

Output: xxpar, file containing parameter estimates and other basic data and plots (see Distn worksheet in Excel play form)

OGRa.fn

Generates fully risked oil/gas deposits; each play is 10,000 runs.

Input is xxpar & a random number seed

Output: xxres (this is the basic detailed output file)

soila.fn (function called by OGRa.fn)

Contains the formula to generate oil accumulations

Input is number of oil accumulations to be generated, number of prospects, parameter file xxpar, sample numbers, and correlation between attributes

Output is accumulation sizes

sgasa.fn (function called by OGRa.fn-similar to soila.fn except generates gas accumulations.

OGDepSum.fn

Generates play file and deposit summary stats and plots

Input: play name, xxres

Output: xxplay; one record for each successful simulation run

OGPS.fn

Summary stats (mean, std dev, quantiles) for each oil/gas commodity

Input: play name, xxplay, xxdata

Output: xxpss (summary stats; goes to Result sheet in Excel play form)

OGsfhist.fn

Creates summary information for oil/gas size-frequency bar plots

Input: xxres, xxdata, og (og=1 for oil & =2 for gas)

Output: xxycnt, where y=o for oil and g for gas

OGsfreq.fn

Generates size-frequency bar plots for oil and gas

Input: play name, xxycnt, og

Output: plots (see Size_Freq worksheet in Excel play form)

OGcorr.fn

Checks user specified 24 x 24 correlation matrix to see if it is permissible and adjusts correlations if necessary

Input: user specified correlation matrix, AllocPR, random number seed

Output: Adjusted correlation matrix (CodepAdjB) or sample number for aggregating plays

OGagg.fn

Aggregates play results

Input: Sample number file, AllocPR, tf (=1 for total land, =2 for Federal land)

Output: file containing aggregate results for oil/gas commodities and corresponding sample numbers

OGsummary.fn

Summarizes aggregate file; means, quantiles

Input: aggregate file

Output: summary file (to aggregation results Excel worksheet)

Appendix B. Definitions for NPRA Assessment Form

The following definitions were updated by J.H. Schuenemeyer, as appropriate, from those by R. Charpentier, Definitions *in* The Oil and Gas Resource Potential of the 1002 Area, Arctic National Wildlife Refuge, Alaska, by ANWR Assessment Team, U.S. Geological Survey Open-File Report 98-34.

Hydrocarbon Volume Attributes: Distributions were specified for five attributes (listed below) used to calculate the volumes of oil and gas accumulations in the simulation program and in economic scenarios. Because the simulation program calculates an accumulation size using one randomly sampled number from each fitted distribution, spread in the distributions reflects variability between accumulations. Even though some attributes (net reservoir thickness, porosity, and trap fill) could show variation within an individual accumulation that source of variability is beyond the level of detail used in this analysis. The distribution of porosity, for example, shows how the average porosity in an accumulation may vary from one accumulation to another. A sampled value of porosity should be viewed as the mean value in a given accumulation. All of the hydrocarbon volume attributes are conditional distributions -- conditional on both the play being favorable and the prospect being favorable. In other words, the uncertainty expressed in the specification of the hydrocarbon volume attributes is not intended to reflect the chance that such an attribute will be present. This is addressed by the risking. Rather, the spread in the distributions, reflects geologic uncertainty and lack of knowledge.

Net Reservoir Thickness: A distribution for net reservoir thickness (in feet) in accumulations. The distribution shows how the average net reservoir thickness may change from accumulation to accumulation. It is not the same as the prospect height because it only includes net thickness of reservoir-quality rocks. It is also not the same as net pay thickness, because only some proportion of the reservoir rock contains hydrocarbons. (See trap fill.)

Area of Closure: A distribution for area of trap closure (in thousands of acres) of accumulations.

Porosity: A distribution for average porosity (in percent) in accumulations. The distribution shows how the average porosity may change from accumulation to accumulation.

Trap Fill: A distribution for trap fill (in percent) in accumulations. It is the volumetric percent of the gross reservoir volume (area of closure times net thickness) containing hydrocarbons.

Trap Depth: A distribution for trap depth (in thousands of feet sub sea level) in accumulations. The distribution shows how the average trap depth changes from accumulation to accumulation. A correction factor for the average ground elevation in the play area is added to Trap Depth to facilitate calculations of depth-related engineering parameters such as reservoir temperature and pressure.

Risking:

Minimum Reservoir Size Oil: The smallest accumulation size being assessed, in this case 50 million barrels (MMBO) in-place at surface conditions. Smaller accumulations may exist in the play but are not being assessed.

Minimum Reservoir Size Nonassociated Gas: The smallest accumulation size being assessed, in this case 250 billion cubic feet (BCF) technically recoverable at surface conditions. Smaller accumulations may exist in the play but are not being assessed.

Number of Prospects: A distribution showing uncertainty in the number of drillable prospects for accumulations of the minimum size or larger. This distribution is conditional on the play being favorable.

Play Attributes: Three probabilities -- Charge (C), Trap (T), and Timing (F) -- that are used in calculating the Play Probability.

Charge (C): The probability that there has been sufficient source rock, thermal history, and migration to allow for at least one accumulation of minimum size or larger somewhere within the play.

Trap (T): The probability of the occurrence of rocks containing suitable reservoir characteristics, sealing characteristics, and trap geometry capable of containing at least one accumulation of minimum size or larger somewhere within the play.

Timing (F): The probability that the timing of trap formation relative to hydrocarbon generation/migration was favorable for an accumulation of minimum size or larger somewhere within the play.

Play Probability: The probability that the play is favorable, i.e., that the play attributes are adequate to allow at least one accumulation of minimum size or larger. It is calculated as the product of the three play attributes -- Charge (C), Trap (T), and Timing (F) -- which are assumed to be pairwise independent. Favorability of the product of the three play attributes is necessary, but not sufficient, for the existence of an accumulation of minimum size or larger. With a small number of prospects, there is some probability that the play attributes are favorable, but just not present in any one prospect.

Play Risk: The probability that the play is unfavorable, i.e., that the play attributes are not sufficiently favorable to allow any accumulations of minimum size or larger. It is calculated as 1 minus the Play Probability.

Prospect Attributes: Three probabilities -- Charge (c), Trap (t), and Timing (f) -- that are used in calculating the Prospect Probability. All of them are conditional probabilities -- conditional on the play being favorable. Probabilities are expressed relative to a randomly chosen prospect. This can also be thought of as giving the proportion of prospects for which a particular condition is favorable. These differ from the play attributes. For example, one may be certain that there has been sufficient source rock, thermal history, and migration to allow at least one accumulation of minimum size or larger somewhere within the play ($C = 1.0$) but estimate that only 50% of the prospects have had adequate migration paths open ($c = 0.5$).

Charge (c): The probability (given that the play is favorable) that a randomly chosen prospect has been charged by fluids sufficient for an accumulation of minimum size or larger.

Trap (t): The probability (given that the play is favorable) that a randomly chosen prospect has suitable reservoir characteristics, sealing characteristics, and trap geometry capable of containing an accumulation of minimum size or larger.

Timing (f): The probability (given that the play is favorable) that a randomly chosen prospect has timing of trap formation relative to hydrocarbon generation/migration favorable for an accumulation of minimum size or larger.

Prospect Probability: The probability that a randomly chosen prospect is favorable (given that the play is favorable), i.e., that the prospect contains an accumulation of minimum size or larger. It is calculated as the product of the three prospect attributes -- Charge (c), Trap (t), and Timing (f) -- which are assumed to be pairwise independent. Favorability of the product of the three prospect attributes is both necessary and sufficient for the existence of an accumulation of minimum size or larger in a prospect. The prospect probability can also be thought of as giving the proportion of prospects that contain an accumulation of minimum size or greater.

Prospect Risk: The probability that a randomly chosen prospect is unfavorable, i.e., that the prospect does not contain an accumulation of minimum size or larger. It is calculated as 1 minus the Prospect Probability.

Fraction of Accumulations Being Oil: That proportion of the accumulations that will be simulated as oil accumulations as opposed to nonassociated gas accumulations.

Miscellaneous:

Accumulation: Trapped hydrocarbons in contiguous pools of a particular play. In this assessment only accumulations of minimum size or larger are being assessed.

Field: One or more accumulations whose projections on the earth's surface are the same or overlap. All the pools in an accumulation are of the same play, but a field may include pools of different plays. The simulation methodology for plays estimates accumulation sizes. Fields are important principally in the economic part of the analysis.

Play: A geologically homogeneous collection of accumulations (discovered and undiscovered) and prospects. Homogeneous is, of course, a relative term and the amount of variability acceptable within a play can vary with data available and methodology used. The accumulations within a play generally share similar source rocks, migration pathways, timing of relevant events, trapping mechanisms, and hydrocarbon types.

Play Area: A geographic area that includes all the discovered accumulations (if any) and all the prospects (if any) in a particular play.

Prospect: A drillable feature that may contain trapped hydrocarbons.

Figure 1. Oil formation volume factor versus trap depth for selected gravities.

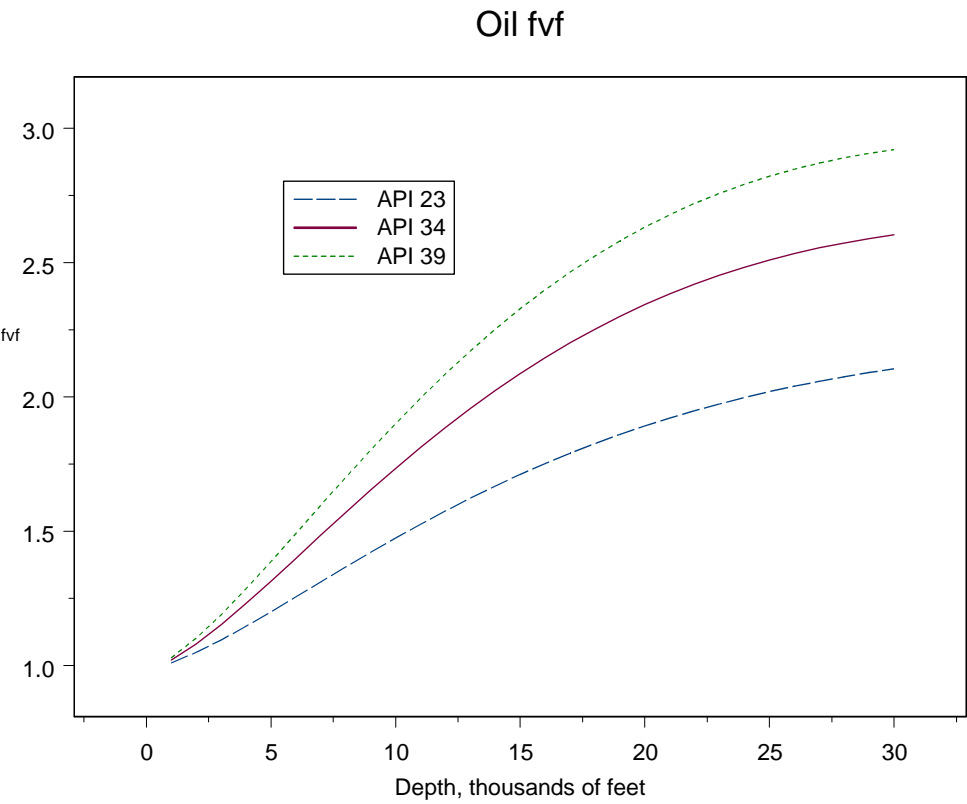


Figure 2. Gas formation volume factor versus trap depth.

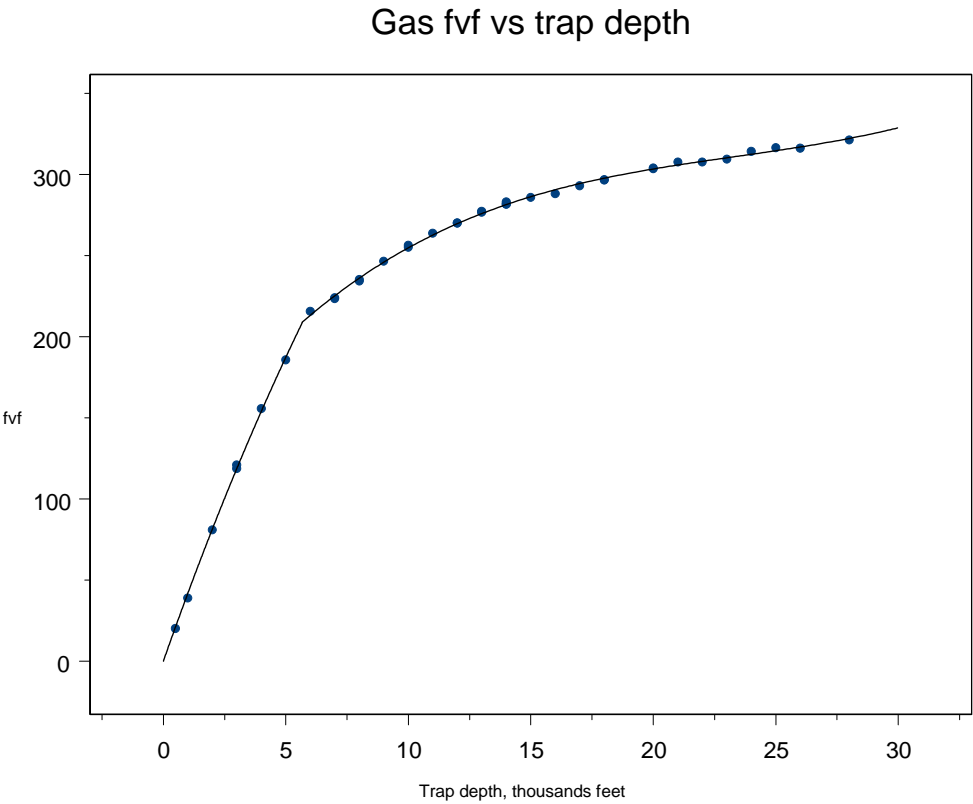


Figure 3. General flow chart for simulation algorithm.

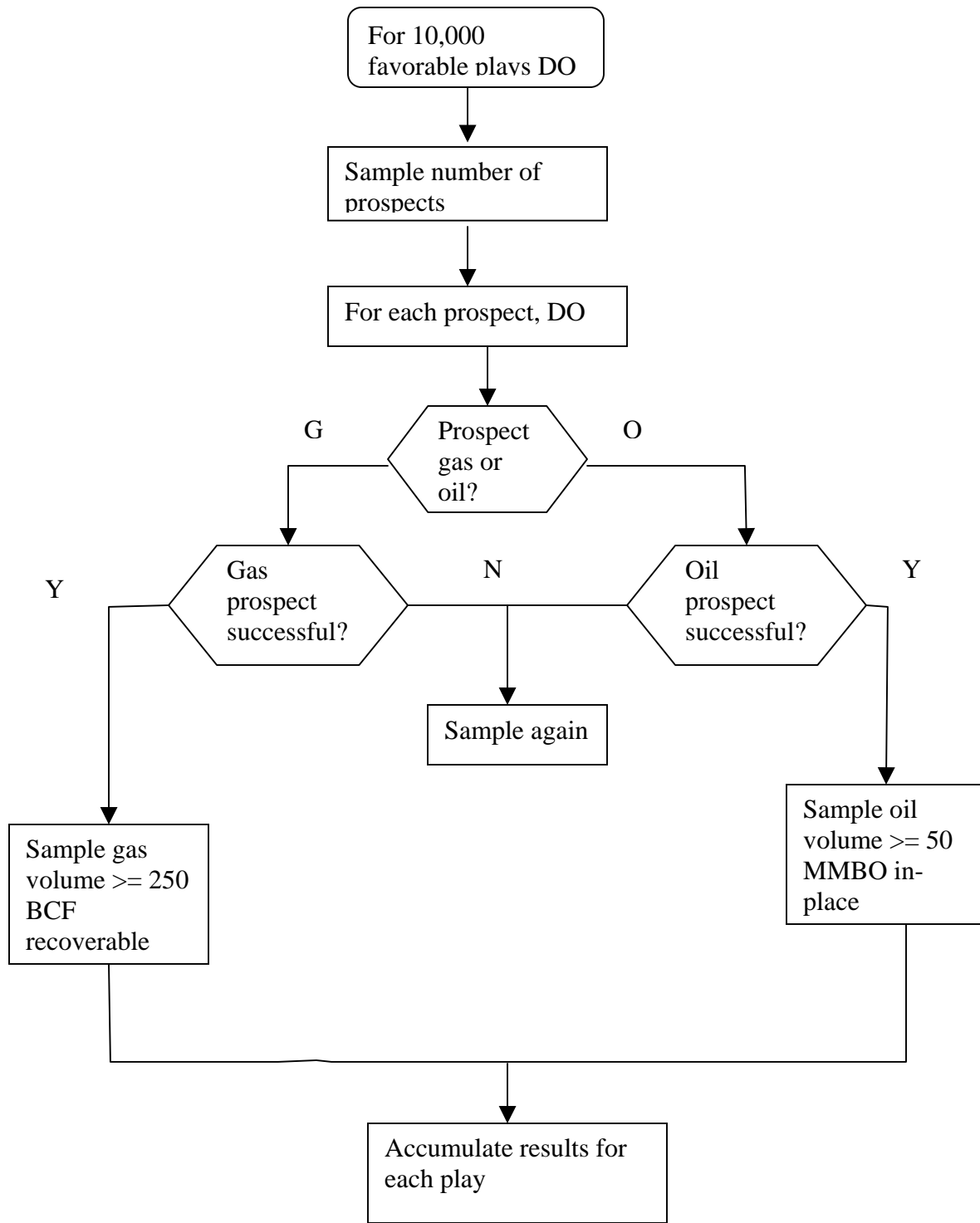


Table 1a. Assessment form for oil.

NPRA Assessment Form-2001PLAY: **EXAMPLE PLAY**Play area: **18304 10³ Acres****OIL ACCUMULATION VOLUME PARAMETERS**

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		LTP	0.50	0.05	Max	
NET RESERVOIR THICKNESS ¹	2	25	50	75	200	2
AREA OF CLOSURE ²	2	3	5	10	20	2
POROSITY ^{3,4}	1	15	18	19	21	2
TRAP FILL ³	3	40	50	75	100	2
HYDROCARBON PORE VOL ^{3,4}	3	9	12	13	15	6
Approx mm bbl (fvf=1)		17.5	116.4	567.3	4654.8	
Recov mm bbl at surface		4.7	31.2	152.1	1248.1	

1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

TRAP DEPTH (in 1000 ft) **4** **1** **5** **9** **10** **1**
(from sea level) Surface to sea level correction (1000 ft): **0.492**

OIL ACCUMULATION CHARACTERISTICSOil recovery factor % **35**

Type of reservoir-drive (check any that apply):

Water: ☐Depletion: ☒Gas expansion: ☐

FVF (Formation volume factor, rb/stb):

1.31 (at median depth)FVF=0.972+0.000147*F^{1.175}

Pressure(psi)

2500

P=TD*0.5*1000

TD=trap depth (thous ft), P=pressure (psi)

temp(deg F)

125

T=19*TD+30

T=temp deg F

LN is log base e

SolGasGr

0.705

SGG=((0.1402*LN(C27+14.7)-0.4227)+(0.1369*LN(C28)+0.0156)+(0.1704*LN(E37)+0.1465 AG=API gravity

F

717Uncorrected GOR=SGG*((P+14.7)*10^{0.0125*AG}/(18*10^{0.00091*T}))^{1/0.83}F= Final GOR*(SGG/OG)^{0.5+1.25*T}

OG=141.5/(131.5+AG)

GOR (Associated gas to oil ratio, cu.ft./bbl, at stp):

613

Final GOR at median depth

712

Uncorrected GOR

NGLR (Natural gas liquids to associated gas ratio, bbls/million cu.ft., at stp)= 4.5985*exp(.1711*TD)

10.8 (median depth)

Oil quality parameters:

API gravity

37

Oil Grav (ratio)

0.840

Sulfur content of oil

0.3

Associated gas quality parameters:

Hydrogen sulfide %

0

CO2 contamination %

0

Other inert gases:

Name:

Percent:

Name:

Percent:

TIME OF TRAP DEVELOPMENT

BEGIN

PEAK

END

STRATIGRAPHIC COMPONENT (Ma)

120**115****95**

STRUCTURAL COMPONENT (Ma)

Assessor's Name:

Dave Houseknecht

Date of Data Entry MM/DD/YYYY:

10/19/01

Date of Simulation Run MM/DD/YYYY:

1/16/02

Note: only enter play name and assessor's name on Oil worksheet

Table 1b. Assessment form for gas.

NPRA Assessment Form-2001

PLAY: Example play

NONASSOCIATED GAS ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		LTP	50	5	Max	
NET RESERVOIR THICKNESS ¹	2	25	50	75	200	2
AREA OF CLOSURE ²	2	3	5	10	20	2
POROSITY ^{3,4}	1	15	18	19	21	2
TRAP FILL ³	3	40	50	75	100	2
HYDROCARBON PORE VOL ^{3,4}		9	12	13	15	
Approx in place bcf		0.10	0.65	3.19	26.14	
Recov bcf at surface		11.9	79.6	387.9	3182.4	
1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0 5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point						
TRAP DEPTH (in 1000 ft) (from sea level)	4	1	5	9	10	1
Surface to sea level correction (1000 ft):					0.492	

Uses oil POR*Sw

6

NONASSOCIATED GAS ACCUMULATION CHARACTERISTICS

NA Gas recovery factor %

Type of reservoir-drive (check any that apply):

Water:

Gas expansion:

Natural gas liquids plus condensate to non-associated gas (bbls/million cf) (in place):

NGL-NAG=1.785*TD (at median)

Non-associated gas quality parameters:

Hydrogen sulfide %

CO2 contamination %

Other inert gases:

Name:

Percent:

Name:

Percent:

Gas fvf

(at median depth)

Gas fvf= $752.2 \cdot (1 - \exp(-0.05728 \cdot TD))$

$113.3 + 21.1 \cdot TD - 0.812 \cdot TD^2 + 0.0116 \cdot TD^3$

TD=trap depth (thous ft)

TD<=5.67 thous ft

5.67<TD<=30

TIME OF TRAP DEVELOPMENT

STRATIGRAPHIC COMPONENT (Ma)

STRUCTURAL COMPONENT (Ma)

BEGIN

PEAK

END

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Table 1c. Assessment form for risking.

NPRA Assessment Form-2001

Play: Example play

RISKING

MINIMUM ACCUMULATION SIZE, MAS (Millions of BBL in place)

50

PRERISKED FREQUENCY DISTRIBUTION (Oil plus Gas)

NUM OF PROSPECTS > MINIMUM SIZE	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
	Est Shape	Min	50	5	Max
	2	25	50	75	100
					3

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

ATTRIBUTES

PLAY
ATTRIBUTES

CHARGE (C)
TRAP (T)
TIMING (F)

Probability that play contains at least 1 reservoir \geq minimum size (CxTxF)

PROBABILITY OF FAVORABLE

Computed

1
1
1

1

PROSPECT
ATTRIBUTES

CHARGE (c)
TRAP (t)
TIMING (f)

Probability that a randomly chosen prospect is favorable (cxtxf)

0.6
0.2
1

0.12

Play Attributes x Prospect Attributes (CxTxFxcxtxf)

0.12

FRACTION OF ACCUMULATIONS BEING OIL

Fraction NA Gas=1-Fraction(Oil)

0.9

0.1

Allocation (percent):

	Land	Oil	Gas
Federal	90	86	92
State	6	10	5
Native	4	4	3

Assessor's Name:

Dave Houseknecht

Date of Data Entry MM/DD/YYYY:

10/19/01

Date of Simulation Run MM/DD/YYYY:

1/16/02

Table 1d. Instructions for NPRA Assessment Form-2001

Contents (worksheets)

Instr - contents and general instructions
Shapes - examples of distribution shapes
Oil - Oil accumulation volume parameters (for assessor input)
Gas - Gas accumulation volume parameters (for assessor input)
Play-Prospect (PP)- Perisked frequency distribution, play risks, and prospect risks (for assessor input)
Playwork - worksheet for plays (for data transfer to Splus algorithms)
Distn - fitted distribution of oil and gas hydrocarbon attributes
Results - summary statistics and plots for play results
Size-Freq - size frequency distribution and histograms
Stats - summary stats for sampled distributions of oil/gas hydrocarbon volume parameters

Suggested order to specify volume parameters, trap depth, and frequency distributions

- 1 Specify your perception of the general form of (untruncated) distribution using attached Shapes worksheet
- 2 Specify Left Truncation Point (LTP)
 - * For oil and gas hydrocarbon parameters, this value should be consistent with minimum accumulation size (MAS), i.e., these should generate an accumulation approximately equal to the MAS. You will be provided feedback to ensure consistency with MAS.
 - * In general the LTP will be greater than zero.
 - * Note, we are assuming that the population distribution begins at or very near zero.
If this is not true, a shift parameter will need to be specified
LTP is the minimum value for Trap Depth and Number of Prospects
- 3 Specify Max. This must be a finite value. It is to be the maximum as opposed to say the 1 fractile.
- 4 Specify the median (50th fractile). Note that this value is with respect to the untruncated distribution.
The kth fractile, defined as F_k , where $(0 \leq k \leq 100)$, is a value such that the probability that a randomly chosen value, say X is $> F_k = 0.01 \cdot k$, i.e., $P(X > F_k) = 0.01 \cdot k$.
In the Sheet worksheet, for the Right (positive) skewed density distribution $F_{05} = 0.52$
- 5 Specify the 5th fractile with respect to the untruncated distribution.

In the Shapes worksheet examples, the value of the attribute X is between 0 and 1.
Probability density, cumulative density, and F_{95} , F_{50} , and F_{05} fractiles are given.
The LTP is assumed to be F_{95} in the Shapes worksheet but need not be so. The MAS should guide the choice of the LTP
MAS - Minimum Accumulation Size
LTP - Left Truncation Point

Dependencies

The model assumes pairwise independence between all oil and gas accumulations attributes except that the correlation between proosity and water saturation is assumed to be -1.0
We assume that number of prospects (Play-Prospect worksheet) is independent of Oil and Gas hydrocarbon parameters

Protocol for Entering Distributions & Feedback

- 1 Use actual data when possible (assessor decides that a given data set is representative of a play)
- 2 Specify fractiles as indicated above
At this stage feedback (graphs and statistics) on individual attributes is given to assessors
- 3 Assessors modify distributions as appropriate
After receiving modified attribute distributions (oil or gas hydrocarbon parameters), an oil/gas accumulation size distribution will be generated. If the minimum accumulation is < 25 MMBOE or > 60 MMBOE (for a 50 MMBOE MAS) the assessor will be informed and may chose to modify hydrocarbon attributes. If the minimum is below 25MMBOE one or more LTP for the hydrocarbon volume parameters may be too low. If the maximum is above 60 MMBOE, one or more LTP's for the hydrocarbon volume parameters may be set too high.

Form's Author: Jack Schuenemeyer

Form last modified: 10/24/2001

Table 1e. Distribution shapes specified in the NPRA assessment form.

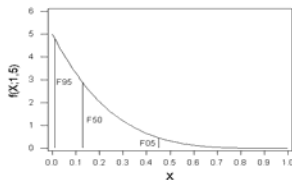
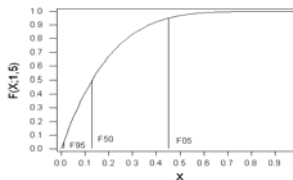
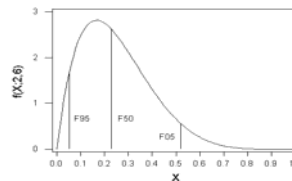
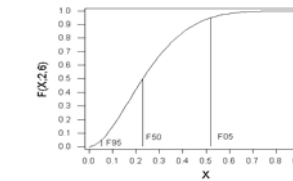
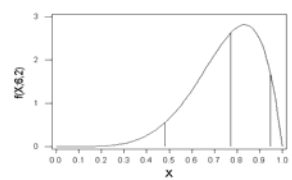
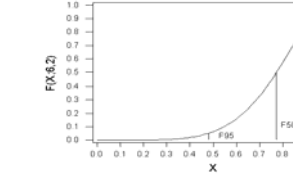
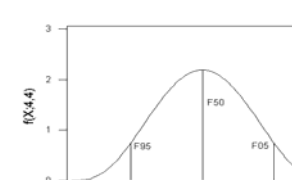
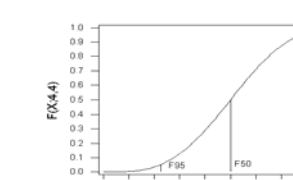
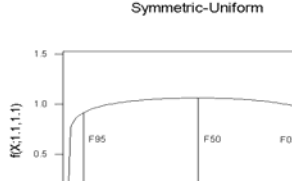
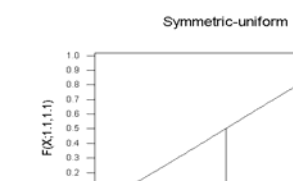
Shape 1	<div>Probability Density J-shaped (mode=0)</div> 	<div>Cumulative Density J-shaped (mode=0)</div> 	<table><tr><td>F95</td><td>0.01</td></tr><tr><td>F50</td><td>0.13</td></tr><tr><td>F05</td><td>0.45</td></tr><tr><td>Mean</td><td>0.33</td></tr></table>	F95	0.01	F50	0.13	F05	0.45	Mean	0.33
F95	0.01										
F50	0.13										
F05	0.45										
Mean	0.33										
Shape 2	<div>Right (positive) skewed</div> 	<div>Right (positive) skewed</div> 	<table><tr><td>F95</td><td>0.05</td></tr><tr><td>F50</td><td>0.23</td></tr><tr><td>F05</td><td>0.52</td></tr><tr><td>Mean</td><td>0.25</td></tr></table>	F95	0.05	F50	0.23	F05	0.52	Mean	0.25
F95	0.05										
F50	0.23										
F05	0.52										
Mean	0.25										
Shape 3	<div>Left (negative) skewed</div> 	<div>Left (negative) skewed</div> 	<table><tr><td>F95</td><td>0.48</td></tr><tr><td>F50</td><td>0.77</td></tr><tr><td>F05</td><td>0.95</td></tr><tr><td>Mean</td><td>0.75</td></tr></table>	F95	0.48	F50	0.77	F05	0.95	Mean	0.75
F95	0.48										
F50	0.77										
F05	0.95										
Mean	0.75										
Shape 4	<div>Symmetric-Normal</div> 	<div>Symmetric-normal</div> 	<table><tr><td>F95</td><td>0.23</td></tr><tr><td>F50</td><td>0.50</td></tr><tr><td>F05</td><td>0.77</td></tr><tr><td>Mean</td><td>0.50</td></tr></table>	F95	0.23	F50	0.50	F05	0.77	Mean	0.50
F95	0.23										
F50	0.50										
F05	0.77										
Mean	0.50										
Shape 5	<div>Symmetric-Uniform</div> 	<div>Symmetric-uniform</div> 	<table><tr><td>F95</td><td>0.06</td></tr><tr><td>F50</td><td>0.50</td></tr><tr><td>F05</td><td>0.94</td></tr><tr><td>Mean</td><td>0.50</td></tr></table>	F95	0.06	F50	0.50	F05	0.94	Mean	0.50
F95	0.06										
F50	0.50										
F05	0.94										
Mean	0.50										
Shape 6	Inverse J		<table><tr><td>F95</td><td>0.99</td></tr><tr><td>F50</td><td>0.87</td></tr><tr><td>F05</td><td>0.55</td></tr><tr><td>Mean</td><td>0.67</td></tr></table>	F95	0.99	F50	0.87	F05	0.55	Mean	0.67
F95	0.99										
F50	0.87										
F05	0.55										
Mean	0.67										
Shape 7	Inverse J for TrapFill with F50,F05 and MAX = 100 (50% of probability at 100)										
Shape 8	Inverse J for TrapFill with F05, MAX=100 (5% of probability at 100)										
Shape 9	No variability; estimate is a single number										

Table 2. Equations used to compute co-products in the NPRA assessment.

Oil deposit:

ADG (associated-dissolved gas, in BCFG)

$$ADG = GOR * Oil * 10^{-3}$$

where GOR is the associated gas to oil ratio (see Table ME1a) and the oil is either in-place or recoverable in MMBO.

NGL-ADG (natural gas liquid from ADG, in MMBO)

$$NGL-ADG = NGLR * ADG * 10^{-3}$$

where NGLR is the natural gas liquid to associated gas ratio (see Table ME1a).

Non-associated natural gas deposit:

NGL-GAS (natural gas liquid from non-associated gas, in MMBO)

$$NGL-GAS = NGL-NAG * NAG * 10^{-3}$$

where NGL-NAG is the natural gas liquid to non-associated gas ratio (see Table ME1b) and NAG is non-associated gas (in BCFG).

Table 3. Play name and total Monte Carlo runs for each play in the NPRA assessment

Play Name	Total Runs
Beaufortian Clinoform	11,111
Beaufortian Cretaceous Topset North	11,111
Beaufortian Cretaceous Topset South	10,000
Beaufortian Lower Jurassic Topset	11,111
Beaufortian Upper Jurassic Topset NE	10,000
Beaufortian Upper Jurassic Topset NW	10,000
Beaufortian Upper Jurassic Topset SE	10,000
Beaufortian Upper Jurassic Topset SW	10,000
Brookian Clinoform Central	10,000
Brookian Clinoform North	10,000
Brookian Clinoform South-Deep	12,500
Brookian Clinoform South-Shallow	10,000
Brookian Topset	10,000
Brookian Topset Structural	10,000
Ellesmerian Echooka North	50,000
Ellesmerian Echooka South	20,833
Ellesmerian Endicott North	18,519
Ellesmerian Endicott South	16,667
Ellesmerian Lisburne North	18,519
Ellesmerian Lisburne South	18,519
Ellesmerian Structural	12,500
Ellesmerian Thrust Belt	13,889
Ellesmerian-Ivishak	11,111
Torok Structural	11,111

Table 4. Assessor specified dependencies between plays in the NPRA assessment.

Charge-Trap-Timing	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1 Brookian Topset																							
2 Brookian Topset Structural	M-M-L																						
3 Brookian Clinoform North	H-L-H	M-L-L																					
4 Brookian Clinoform Central	H-L-H	H-L-L	H-H-H																				
5 Brookian Clinoform South-Shallow	M-L-H	H-L-L	M-H-H	M-H-H																			
6 Brookian Clinoform South-Deep	M-L-H	M-L-L	M-H-H	M-H-H	M-H-H																		
7 Torok Structural	M-L-L	H-M-H	L-L-L	H-M-L	H-M-L	H-M-L																	
8 Beaufortian Cretaceous Topset North	M-L-L	L-L-L	M-L-M	L-L-L	L-L-L	L-L-L	L-L-L																
9 Beaufortian Cretaceous Topset South	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	H-L-L	M-L-L	M-M-H															
10 Beaufortian Upper Jurassic Topset NW	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	M-L-M	L-L-M														
11 Beaufortian Upper Jurassic Topset NE	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	M-L-M	L-L-M	H-H-H													
12 Beaufortian Upper Jurassic Topset SW	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	M-L-M	M-L-M	H-H-H	H-H-H												
13 Beaufortian Upper Jurassic Topset SE	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	M-L-M	M-L-M	H-H-H	H-H-H	H-H-H											
14 Beaufortian Lower Jurassic Topset	M-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	M-L-M	L-L-M	M-L-M	M-L-M	L-L-M	L-L-M										
15 Beaufortian Clinoform	M-L-L	M-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	H-L-M	L-L-M	H-M-H	H-L-H	H-H-H	H-H-H	M-L-H									
16 Ellesmerian-Ivishak	M-L-M	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	M-L-H	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	H-L-H	L-L-M								
17 Ellesmerian Endicott North	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L							
18 Ellesmerian Endicott South	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	H-H-H						
19 Ellesmerian Echooka North	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	M-L-M	M-L-M	M-L-M					
20 Ellesmerian Echooka South	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	M-L-M	M-L-M	M-L-M	H-H-H				
21 Ellesmerian Lisburne North	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	M-L-M	M-M-M	M-M-M	H-M-H	H-M-H			
22 Ellesmerian Lisburne South	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	M-L-M	M-M-M	M-M-M	H-M-H	H-M-H	H-H-H		
23 Ellesmerian Structural	L-L-L	L-L-M	L-L-L	L-L-L	L-L-L	L-L-L	L-L-M	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	M-L-L	L-L-L	L-L-L	L-L-L	L-M-L	
24 Ellesmerian Thrust Belt	L-L-L	M-L-M	L-L-L	L-L-L	L-L-L	L-L-L	M-L-M	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	M-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	L-L-L	M-L-M

Enter L, M, H for Low, Medium & High

Table 5. Arithmetic averages of pairwise dependencies in the NPRA assessment.

[illegible]

Table 6. Adjusted correlation matrix for plays in the NPRA assessment.

Adjusted Average Charge-Trap-Timing		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	Brookian Topset																							
2	Brookian Topset Structural	0.31																						
3	Brookian Clinoform North	0.52	0.19																					
4	Brookian Clinoform Central	0.52	0.31	0.74																				
5	Brookian Clinoform South-Shallow	0.41	0.31	0.64	0.64																			
6	Brookian Clinoform South-Deep	0.41	0.19	0.64	0.64	0.64																		
7	Torok Structural	0.19	0.64	0.08	0.41	0.41	0.41																	
8	Beaufortian Cretaceous Topset North	0.19	0.08	0.31	0.08	0.08	0.08	0.08																
9	Beaufortian Cretaceous Topset South	0.08	0.08	0.08	0.08	0.08	0.31	0.19	0.52															
10	Beaufortian Upper Jurassic Topset NW	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.31	0.19														
11	Beaufortian Upper Jurassic Topset NE	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.31	0.19	0.74													
12	Beaufortian Upper Jurassic Topset SW	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.31	0.31	0.74	0.74												
13	Beaufortian Upper Jurassic Topset SE	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.31	0.31	0.74	0.74	0.74											
14	Beaufortian Lower Jurassic Topset	0.19	0.08	0.08	0.08	0.08	0.08	0.08	0.31	0.19	0.31	0.31	0.19	0.19										
15	Beaufortian Clinoform	0.19	0.19	0.08	0.08	0.08	0.08	0.08	0.41	0.19	0.64	0.52	0.74	0.74	0.41									
16	Ellesmerian-Ivishak	0.30	0.08	0.08	0.08	0.08	0.08	0.08	0.41	0.08	0.08	0.08	0.08	0.08	0.52	0.19								
17	Ellesmerian Endicott North	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08							
18	Ellesmerian Endicott South	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.74						
19	Ellesmerian Echooka North	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.31	0.31	0.31					
20	Ellesmerian Echooka South	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.31	0.31	0.31	0.74				
21	Ellesmerian Lisburne North	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.31	0.41	0.41	0.64	0.64			
22	Ellesmerian Lisburne South	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.31	0.41	0.41	0.64	0.64	0.74		
23	Ellesmerian Structural	0.08	0.19	0.08	0.08	0.08	0.08	0.19	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.19	0.08	0.08	0.08	0.19	
24	Ellesmerian Thrust Belt	0.08	0.31	0.08	0.08	0.08	0.08	0.31	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.19	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.31

Minimum eigenvalue = -0.211

Bias Adjustment = 0.212

Table 7a: Input values for oil accumulations in the Brookian Topset Play

NPRA Assessment Form-2001

PLAY:	Brookian Topset
Play area:	18304 10 ³ Acres

OIL ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		LTP	0.50	0.05	Max	
NET RESERVOIR THICKNESS ¹	2	2.5	5.0	7.5	200	2
AREA OF CLOSURE ²	2	3	5	10	2.0	2
POROSITY ^{3,4}	1	1.5	1.8	1.9	2.1	2
TRAP FILL ³	3	4.0	5.0	7.5	10.0	2
HYDROCARBON PORE VOL ^{3,4}	3	9	12	13	15	
Approx mm bbl (fvf=1)		17.5	116.4	567.3	4654.8	
Recov mm bbl at surface		4.7	31.2	152.1	1248.1	
1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0						
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point						
TRAP DEPTH (in 1000 ft) (from sea level)	4	1	5	9	1.0	1
	Surface to sea level correction (1000 ft):				0.492	

OIL ACCUMULATION CHARACTERISTICS

Oil recovery factor %

Type of reservoir-drive (check any that apply):
 Water: Depletion: Gas expansion:

FVF (Formation volume factor, rb/stb): (at median depth) FVF=0.972+0.000147*F^{1.175}

Pressure(psi)	2500	P=TD*0.5*1000	TD=trap depth (thous ft), P=pressure (psi)
temp(deg F)	125	T=19*TD+30	T=temp deg F
SolGasGr	0.705	SGG=((0.1402*LN(C27+14.7)-0.4227)+(0.1369*LN(C28)+0.0156)+(0.1704*LN(E37)+0.0156)+(0.1704*LN(E37)+0.0156)+(0.1704*LN(E37)+0.0156))	LN is log base e
F	7.17	Uncorrected GOR=SGG*((P+14.7)*10 ^{0.0125*AG})/(18*10 ^{0.00091*T}))^(1/0.83)	

GOR (Associated gas to oil ratio, cu.ft./bbl, at stp): Final GOR at median depth
 Uncorrected GOR

NGLR (Natural gas liquids to associated gas ratio, bbls/million cu.ft., at stp)= 4.5985*exp(.1711*TD) (median depth)

Oil quality parameters:
 API gravity Oil Grav (ratio)
 Sulfur content of oil

Associated gas quality parameters:
 Hydrogen sulfide %
 CO2 contamination %
 Other inert gases:
 Name: Percent:
 Name: Percent:

TIME OF TRAP DEVELOPMENT

	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)	120	115	95
STRUCTURAL COMPONENT (Ma)			

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Note: only enter play name and assessor's name on Oil worksheet

Table 7b: Input values for nonassociated gas accumulations in the Brookian Topset Play
NPRA Assessment Form-2001

PLAY: **Brookian Topset**

NONASSOCIATED GAS ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		LTP	50	5	Max	
NET RESERVOIR THICKNESS ¹	2	25	50	75	200	2
AREA OF CLOSURE ²	2	3	5	10	20	2
POROSITY ^{3,4}	1	15	18	19	21	2
TRAP FILL ³	3	40	50	75	100	2
HYDROCARBON PORE VOL ^{3,4}	9	12	13	15		6
Approx in place bcf	0.10	0.65	3.19	26.14		
Recov bcf at surface	11.9	79.6	387.9	3182.4		

1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

TRAP DEPTH (in 1000 ft) (from sea level)	4	1	5	9	10	1
Surface to sea level correction (1000 ft):					0.492	

NONASSOCIATED GAS ACCUMULATION CHARACTERISTICS

NA Gas recovery factor %

Type of reservoir-drive (check any that apply):
Water: Gas expansion:

Natural gas liquids plus condensate to non-associated gas (bbbls/million cf) (in place):
NGL-NAG=1.785*TD (at median)

Non-associated gas quality parameters:
Hydrogen sulfide %
CO2 contamination %
Other inert gases:
Name: Percent:
Name: Percent:

Gas fvf Gas fvf= $752.2 \cdot (1 - \exp(-0.05728 \cdot TD))$ TD ≤ 5.67 thous ft
(at median depth) $113.3 + 21.1 \cdot TD - 0.812 \cdot TD^2 + 0.0116 \cdot TD^3$ 5.67 < TD ≤ 30
TD=trap depth (thous ft)

TIME OF TRAP DEVELOPMENT	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)			
STRUCTURAL COMPONENT (Ma)			

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Table 7c: Input risking values for the Brookian Topset Play

NPRA Assessment Form-2001

Play: Brookian Topset

RISKING

MINIMUM ACCUMULATION SIZE, MAS (Millions of BBL in place)

50

PRERISKED FREQUENCY DISTRIBUTION (Oil plus Gas)

NUM OF PROSPECTS > MINIMUM SIZE	PROB OF AND GREATER THAN					Knowledge Level 1-3 ⁵
	Est Shape	Min	5 0	5	Max	
	2	2 5	5 0	7 5	1 0 0	3

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

ATTRIBUTES

PLAY CHARGE (C)
ATTRIBUTES TRAP (T)
TIMING (F)

PROBABILITY OF FAVORABLE

Computed

1
1
1

Probability that play contains at least 1 reservoir \geq minimum size (CxTxF)

1

PROSPECT CHARGE (c)
ATTRIBUTES TRAP (t)
TIMING (f)

0.6
0.2
1

Probability that a randomly chosen prospect is favorable (cxtxf)

0.12

Play Attributes x Prospect Attributes (CxTxFxcxtxf)

0.12

FRACTION OF ACCUMULATIONS BEING OIL

0.9

Fraction NA Gas=1-Fraction(Oil)

0.1

Allocation (percent):

	Land	Oil	Gas
Federal	90	86	92
State	6	10	5
Native	4	4	3

Assessor's Name:

Dave Houseknecht

Date of Data Entry MM/DD/YYYY:

10/19/01

Date of Simulation Run MM/DD/YYYY:

1/16/02

Table 7d: Distribution of fitted hydrocarbon volume attributes, trap depth, and number of prospects for the Brookian Topset Play

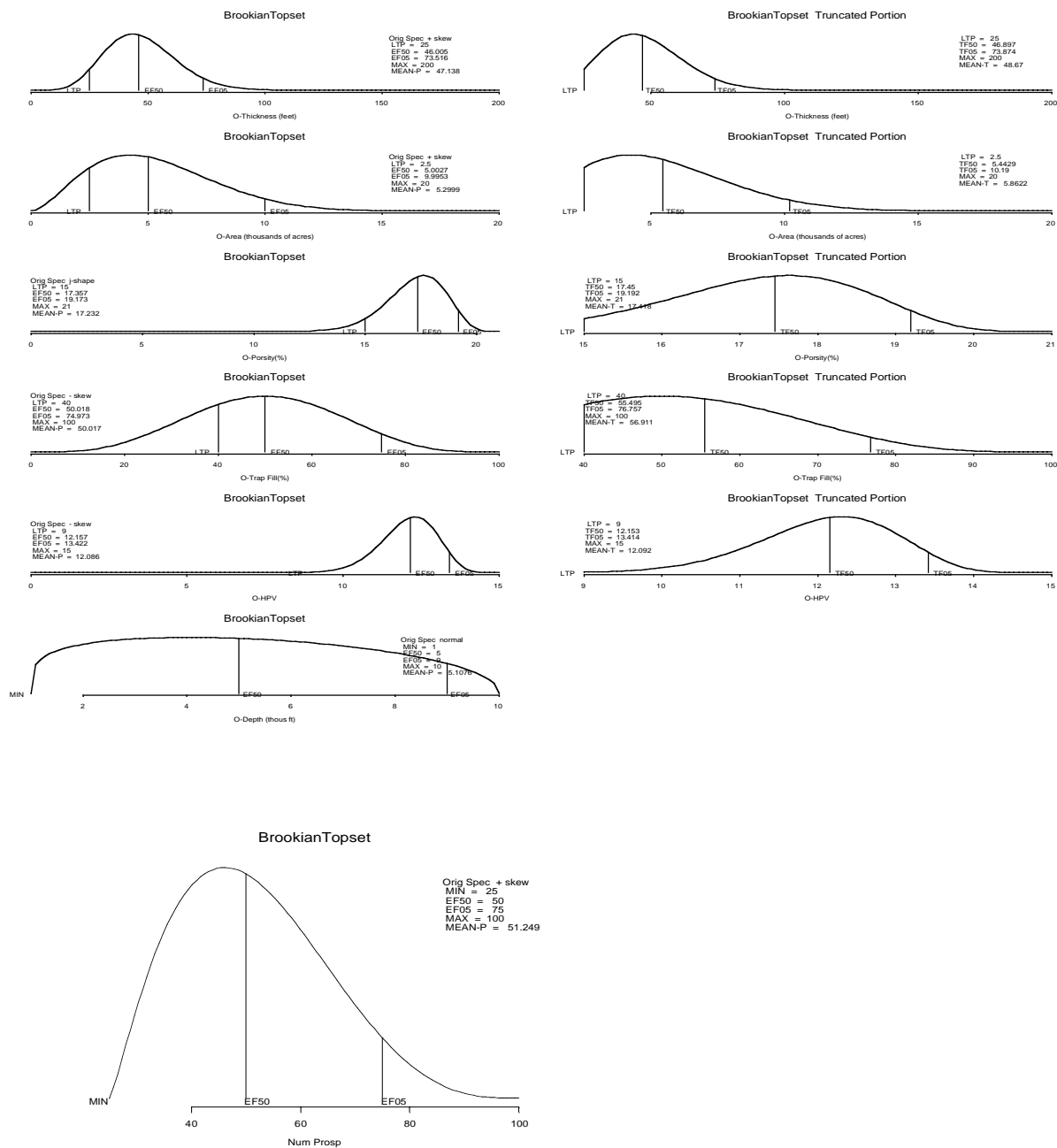
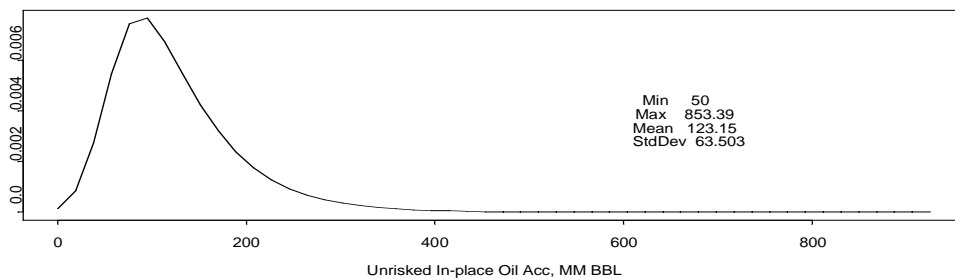


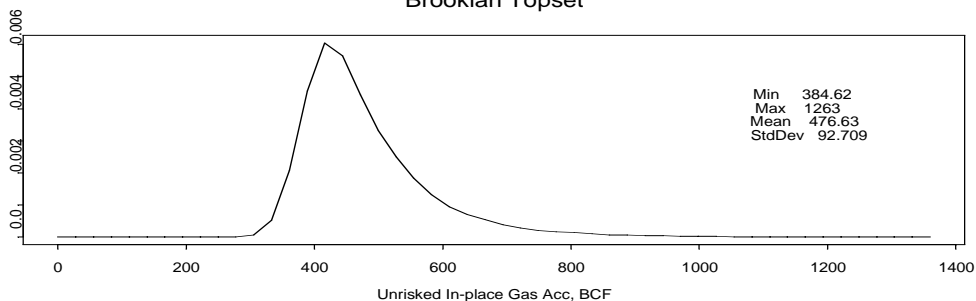
Table 7e: Estimated undiscovered oil and gas resources for the Brookian Topset Play

Deposit stats

Brookian Topset



Brookian Topset



Play Stats

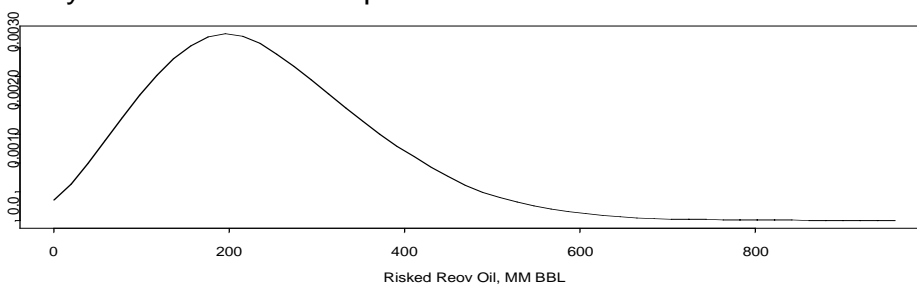
Resource	Unit	Mean	StdDev	F95	F50	F05	Max
In-place oil	MMBO	683.05	358.23	174.00	637.65	1329.23	2480.13
In-place NA gas	BCFG	295.72	388.72	0.00	0.00	1044.66	3630.99
Recov oil	MMBO	239.07	125.38	60.90	223.18	465.23	868.05
Recov assoc diss gas	BCFG	150.94	81.83	36.22	140.58	299.35	590.58
Recov NA gas	BCFG	192.22	252.67	0.00	0.00	679.03	2360.14
Recov NGL (ADG)	MMBO	2.90	1.55	0.71	2.71	5.72	11.07
Recov NGL (NAG)	MMBO	2.59	3.50	0.00	0.00	9.58	30.68
Num oil deposits		5.55	2.64	2.00	5.00	10.00	19.00
Num NA gas deposits		0.62	0.80	0.00	0.00	2.00	6.00

10,000 replications

RNS = 33

Run 1/16/2002

Play Totals Brookian Topset



Play Totals Brookian Topset

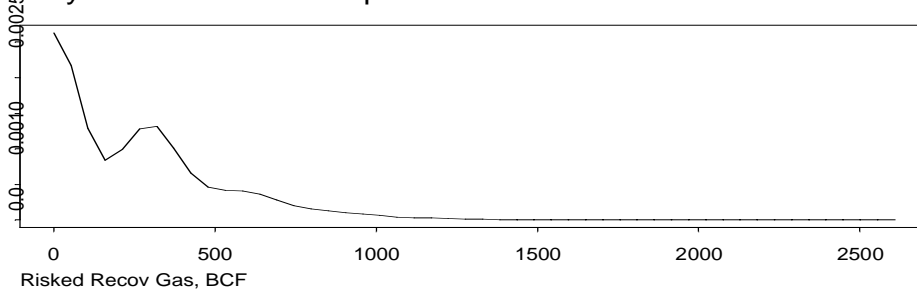


Table 7f: Estimated undiscovered oil and gas resources for the Brookian Topset Play showing number of deposits and volumes by accumulation size class.

Start size class	Oil deposits	Oil (MMBO)	Start size class	Gas deposits	NA Gas (BCFG)
0	0.00	0.00	0	0.00	0.00
8	0.00	0.00	48	0.00	0.00
16	2.10	52.12	96	0.00	0.00
32	2.62	117.57	192	0.56	163.31
64	0.78	63.57	384	0.06	28.84
128	0.04	5.77	768	0.00	0.08
256	0.00	0.06	1536		
512			3072		
Totals	5.55	239.09		0.62	192.24

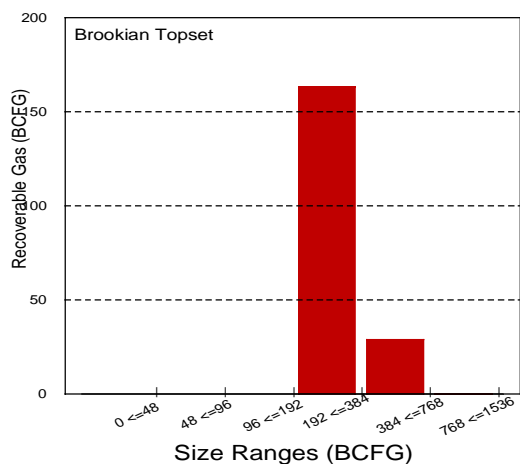
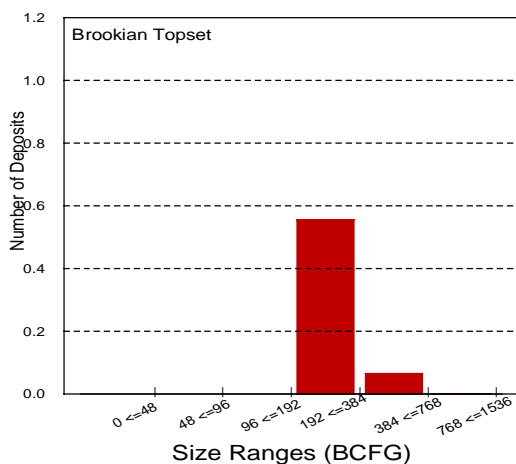
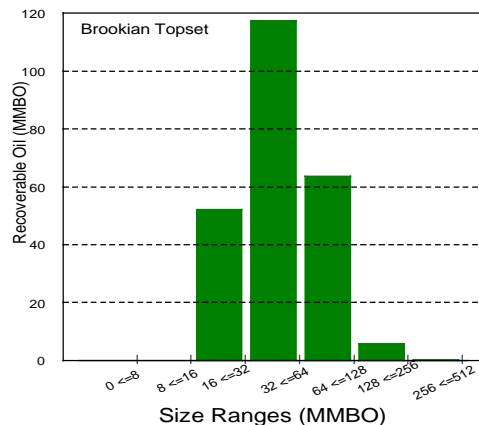
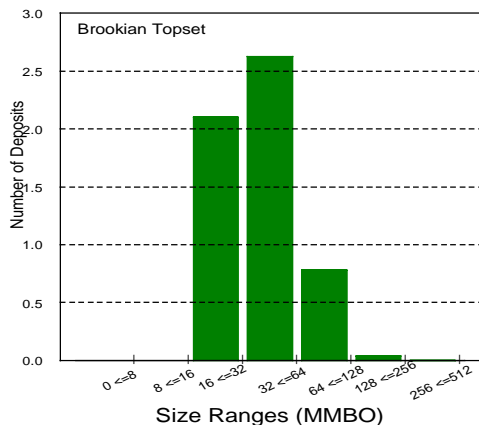


Table 8a: Input values for oil accumulations in the Brookian Clinoform North Play

NPRA Assessment Form-2001

PLAY:	Brookian Clinoform North
Play area:	6791 10 ³ Acres

OIL ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN					Knowledge Level 1-3 ⁵
		LTP	0.50	0.05	Max		
NET RESERVOIR THICKNESS ¹	2	25	60	100	200	2	
AREA OF CLOSURE ²	2	3	5	15	30	2	
POROSITY ^{3,4}	1	12	18	19	21	2	
TRAP FILL ³	7	80	100	100	100	2	Enter POR*Sw
HYDROCARBON PORE VOL ^{3,4}	4	6	12	13	15		6
Approx mm bbl (fvf=1)		23.3	279.3	1512.8	6982.2		
Recov mm bbl at surface		5.5	66.4	359.8	1660.6		

1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

TRAP DEPTH (in 1000 ft)	4	3	7	9	10	1
(from sea level)	Surface to sea level correction (1000 ft):					0.074

OIL ACCUMULATION CHARACTERISTICS

Oil recovery factor %

Type of reservoir-drive (check any that apply):

Water: Depletion: ☒ Gas expansion:

FVF (Formation volume factor, rb/stb): (at median depth) FVF=0.972+0.000147*F^{1.175}

Pressure(psi)	3500	P=TD*0.5*1000	TD=trap depth (thous ft), P=pressure (psi)
temp(deg F)	163	T=19*TD+30	T=temp deg F LN is log base e
SolGasGr	0.732	SGG=((0.1402*LN(C27+14.7)-0.4227)+(0.1369*LN(C28)+0.0156)+(0.1704*LN(E37 AG=API gravity	
F	1013	Uncorrected GOR=SGG*((P+14.7)*10^(0.0125*AG))/(18*10^(0.00091*T))^(1/0.83)	

F= Final GOR*(SGG/OG)^{0.5+1.25*T} OG=141.5/(131.5+AG)

GOR (Associated gas to oil ratio, cu.ft./bbl, at stp): Final GOR at median depth

Uncorrected GOR

NGLR (Natural gas liquids to associated gas ratio, bbls/million cu.ft., at stp)= 4.5985*exp(.1711*TD) (median depth)

Oil quality parameters:

API gravity Oil Grav (ratio)

Sulfur content of oil

Associated gas quality parameters:

Hydrogen sulfide %

CO2 contamination %

Other inert gases:

Name: Percent:

Name: Percent:

TIME OF TRAP DEVELOPMENT

	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)	120	115	95
STRUCTURAL COMPONENT (Ma)			

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Note: only enter play name and assessor's name on Oil worksheet

Table 8b: Input values for nonassociated gas accumulations in the Brookian Clinoform North Play

NPRA Assessment Form-2001

PLAY: **Brookian Clinoform North**

NONASSOCIATED GAS ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		LTP	50	5	Max	
NET RESERVOIR THICKNESS ¹	2	25	60	100	200	2
AREA OF CLOSURE ²	2	3	5	15	30	2
POROSITY ^{3,4}	1	12	18	19	21	2
TRAP FILL ³	7	80	100	100	100	2
HYDROCARBON PORE VOL ^{3,4}	3	6	12	13	15	2
Approx in place bcf		0.13	1.57	8.49	39.20	
Recov bcf at surface		19.1	229.5	1243.3	5738.4	
1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0 5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point						
TRAP DEPTH (in 1000 ft) (from sea level)	4	3	7	9	10	1
Surface to sea level correction (1000 ft):					0.074	

Uses oil POR*Sw
6

NONASSOCIATED GAS ACCUMULATION CHARACTERISTICS

NA Gas recovery factor % **65**

Type of reservoir-drive (check any that apply):

Water: ☐

Gas expansion: ☐

Natural gas liquids plus condensate to non-associated gas (bbls/million cf) (in place):

NGL-NAG=1.785*TD **12.5** (at median)

Non-associated gas quality parameters:

Hydrogen sulfide %

CO2 contamination %

Other inert gases:

Name:

Percent:

Name:

Percent:

Gas fvf **225.2**

Gas fvf= $752.2 \cdot (1 - \exp(-0.05728 \cdot TD))$

TD ≤ 5.67 thous ft

(at median depth)

$113.3 + 21.1 \cdot TD - 0.812 \cdot TD^2 + 0.0116 \cdot TD^3$

5.67 < TD ≤ 30

TD=trap depth (thous ft)

TIME OF TRAP DEVELOPMENT BEGIN PEAK END

STRATIGRAPHIC COMPONENT (Ma)

STRUCTURAL COMPONENT (Ma)

Assessor's Name:

Dave Houseknecht

Date of Data Entry MM/DD/YYYY:

10/19/01

Date of Simulation Run MM/DD/YYYY:

1/18/02

Table 8c: Input risking values for the Brookian Clinoform North Play

NPRA Assessment Form-2001

Play: **Brookian Clinoform North**

RISKING

MINIMUM ACCUMULATION SIZE, MAS (Millions of BBL in place)

50

PRERISKED FREQUENCY DISTRIBUTION (Oil plus Gas)

NUM OF PROSPECTS > MINIMUM SIZE	Est Shape	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		Min	50	5	Max	
	2	25	50	75	100	3

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

ATTRIBUTES

PLAY
ATTRIBUTES

CHARGE (C)
TRAP (T)
TIMING (F)

Probability that play contains at least 1 reservoir \geq minimum size (CxTxF)

PROBABILITY OF FAVORABLE

Computed

1
1
1

1

PROSPECT
ATTRIBUTES

CHARGE (c)
TRAP (t)
TIMING (f)

Probability that a randomly chosen prospect is favorable (cxtxf)

0.9
0.3
1

0.27

Play Attributes x Prospect Attributes (CxTxFxcxtxf)

0.27

FRACTION OF ACCUMULATIONS BEING OIL

Fraction NA Gas=1-Fraction(Oil)

0.9

0.1

Allocation (percent):

	Land	Oil	Gas
Federal	79	80	82
State	13	15	13
Native	8	5	5

Assessor's Name:

Dave Houseknecht

Date of Data Entry MM/DD/YYYY:

10/19/01

Date of Simulation Run MM/DD/YYYY:

1/18/02

Table 8d: Distribution of fitted hydrocarbon volume attributes, trap depth, and number of prospects for the Brookian Clinoform North Play.

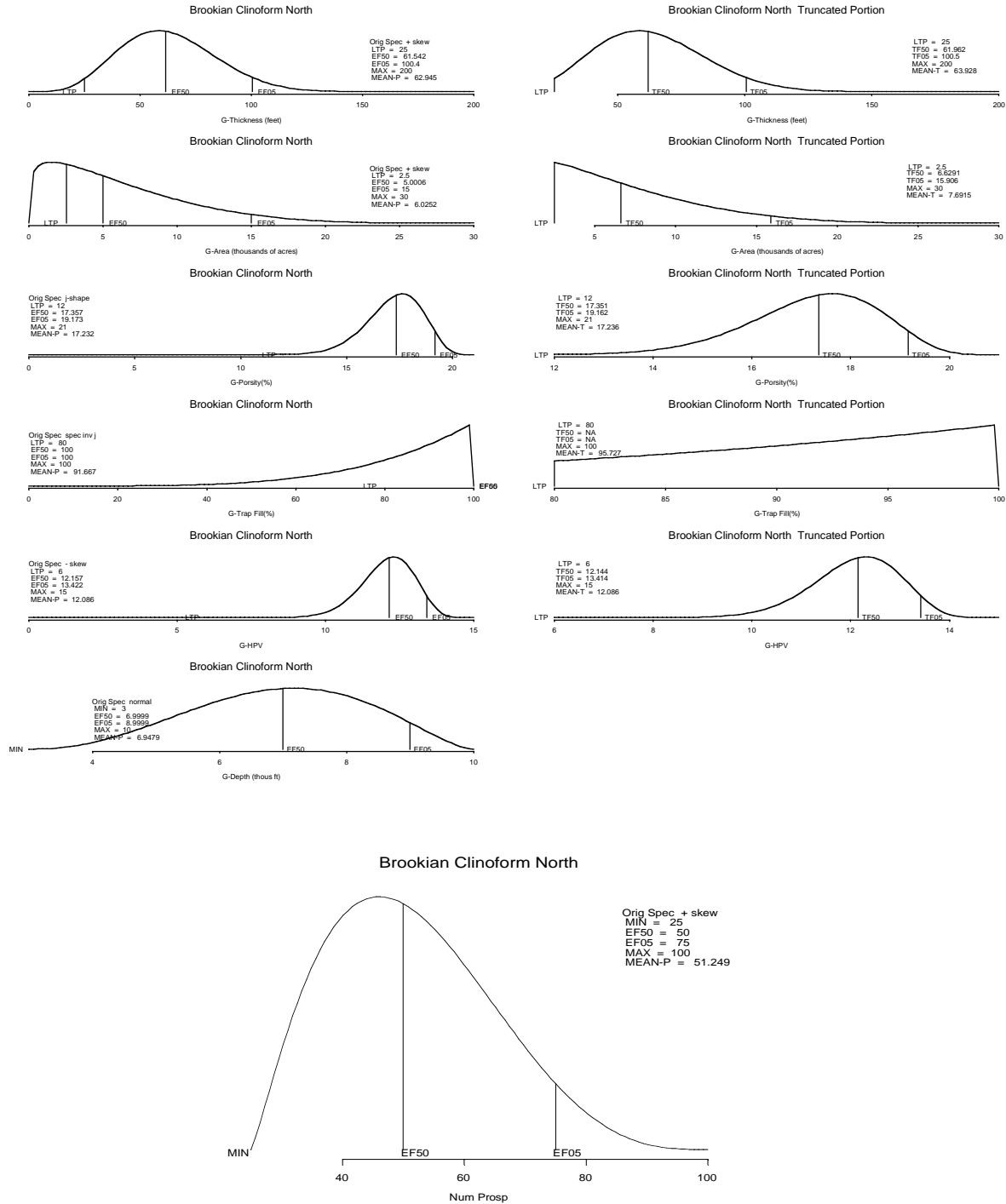
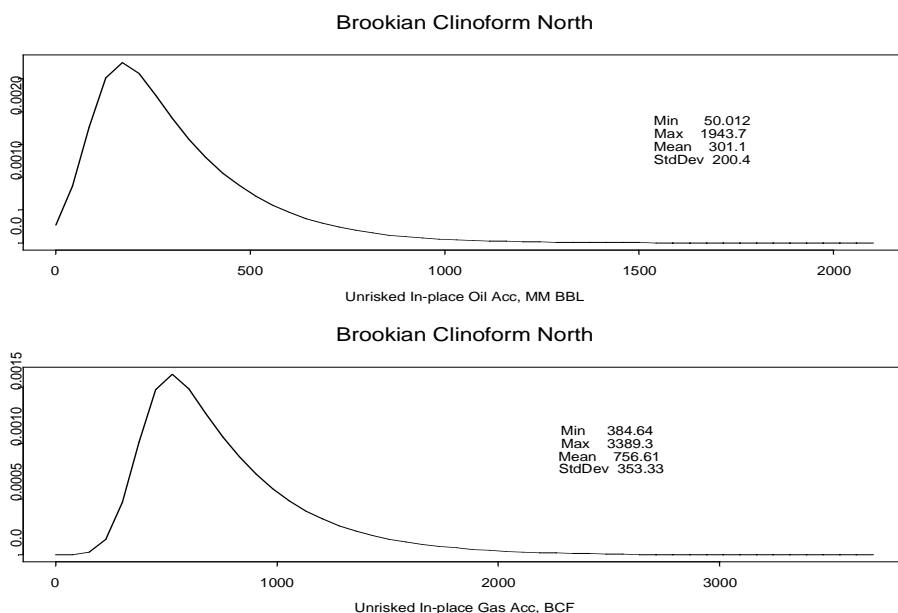


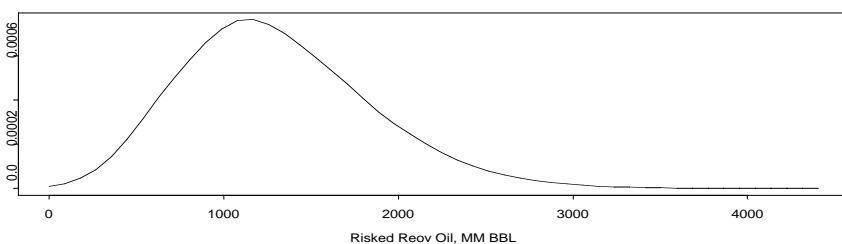
Table 8e: Estimated undiscovered oil and gas resources for the Brookian Clinoform North Play Deposit



Play					
Play Stats					
Resource	Mean	StdDev	F95	F50	F05
In-place oil	3732.23	1516.20	1538.27	3564.19	6449.03
In-place NA gas	1036.98	1015.72	0.00	809.42	3028.58
Recov oil	1306.28	530.67	538.40	1247.47	2257.16
Recov assoc diss gas	1112.34	452.99	459.77	1062.75	1929.85
Recov NA gas	674.04	660.22	0.00	526.12	1968.58
Recov NGL (ADG)	20.12	8.22	8.27	19.20	35.05
Recov NGL (NAG)	8.64	8.62	0.00	6.64	25.67
Num oil deposits	12.40	4.45	6.00	12.00	20.00
Num NA gas deposits	1.37	1.22	0.00	1.00	4.00

RNS=124

Play Totals Brookian Clinoform North



Play Totals Brookian Clinoform North

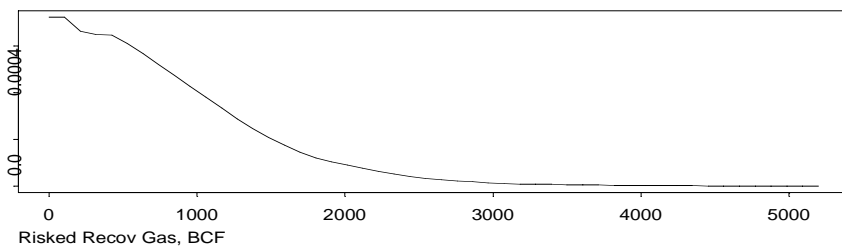


Table 8f: Estimated undiscovered oil and gas resources for the Brookian Clinoform North Play showing number of deposits and volumes by accumulation size class.

Start size class	Oil deposits	Oil (MMBO)	Start size class	Gas deposits	NA Gas (BCFG)
0	0.00	0.00	0	0.00	0.00
8	0.00	0.00	48	0.00	0.00
16	0.71	18.78	96	0.00	0.00
32	3.42	165.74	192	0.57	175.59
64	4.78	440.51	384	0.65	341.77
128	2.97	516.87	768	0.16	150.75
256	0.51	160.63	1536	0.00	5.99
512	0.01	3.75	3072		
Totals	12.40	1306.28		1.37	674.10

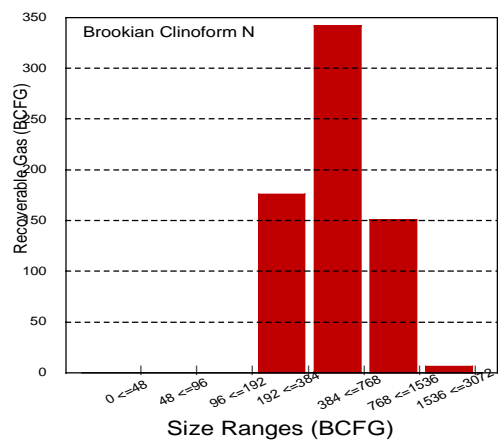
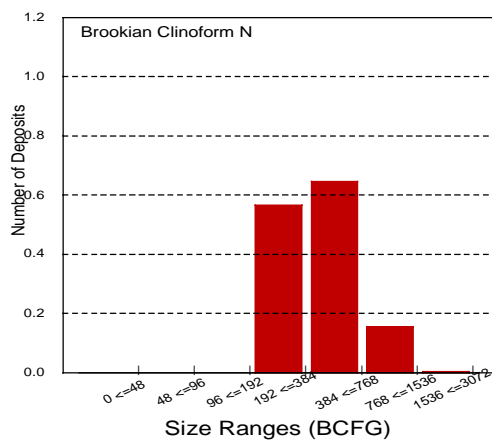
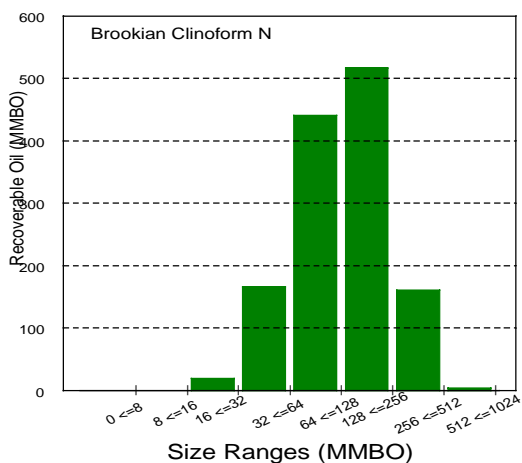
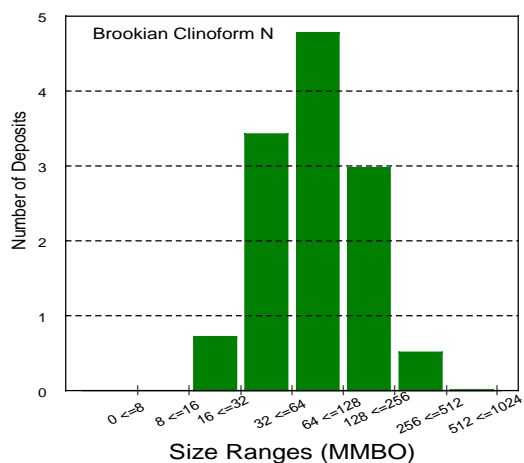


Table 9a: Input values for oil accumulations in the Brookian Clinoform Central Play
NPRA Assessment Form-2001

PLAY:	Brookian Clinoform Central
Play area:	6528 10 ³ Acres

OIL ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		LTP	0.50	0.05	Max	
NET RESERVOIR THICKNESS ¹	2	40	70	150	300	2
AREA OF CLOSURE ²	2	4	6	18	35	2
POROSITY ^{3,4}	3	10	16	19	20	2
TRAP FILL ³	7	80	100	100	100	2
HYDROCARBON PORE VOL ^{3,4}	2	4	10	13	14	6
Approx mm bbl (fvf=1)		39.7	325.8	2723.1	11404.3	
Recov mm bbl at surface		8.1	66.5	556.2	2329.2	

1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

TRAP DEPTH (in 1000 ft)	4	9	10	11	12	1
(from sea level)	Surface to sea level correction (1000 ft):				0.246	

OIL ACCUMULATION CHARACTERISTICS

Oil recovery factor %

Type of reservoir-drive (check any that apply):

Water: Depletion: Gas expansion:

FVF (Formation volume factor, rb/stb): (at median depth) FVF=0.972+0.000147*F^{1.175}

Pressure(psi)	5000	P=TD*0.5*1000	TD=trap depth (thous ft), P=pressure (psi)
temp(deg F)	220	T=19*TD+30	T=temp deg F LN is log base e
SolGasGr	0.763	SGG=((0.1402*LN(C27+14.7)-0.4227)+(0.1369*LN(C28)+0.0156)+(0.1704*LN(E3' AG=API gravity	
F	1417	Uncorrected GOR=SGG*((P+14.7)*10^(0.0125*AG))/(18*10^(0.00091*T)))^(1/0.83)	
		F= Final GOR*(SGG/OG)^0.5+1.25*T	OG=141.5/(131.5+AG)

GOR (Associated gas to oil ratio, cu.ft./bbl, at stp): Final GOR at median depth
 Uncorrected GOR

NGLR (Natural gas liquids to associated gas ratio, bbls/million cu.ft., at stp)= 4.5985*exp(.1711*TD) (median depth)

Oil quality parameters:

API gravity	<input type="text" value="37"/>	Oil Grav (ratio)	<input type="text" value="0.840"/>
Sulfur content of oil	<input type="text" value="0.1"/>		

Associated gas quality parameters:

Hydrogen sulfide %	<input type="text" value="0"/>
CO2 contamination %	<input type="text" value="0"/>

Other inert gases:

Name:	<input type="text"/>	Percent:	<input type="text"/>
Name:	<input type="text"/>	Percent:	<input type="text"/>

	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)	120	115	95
STRUCTURAL COMPONENT (Ma)			

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Note: only enter play name and assessor's name on Oil worksheet

Table 9b: Input values for nonassociated gas accumulations in the Brookian Clinoform Central Play

NPRA Assessment Form-2001

PLAY: Brookian Clinoform Central

NONASSOCIATED GAS ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		LTP	50	5	Max	
NET RESERVOIR THICKNESS ¹	2	40	70	150	300	2
AREA OF CLOSURE ²	2	4	6	18	35	2
POROSITY ^{3,4}	3	10	16	19	20	2
TRAP FILL ³	7	80	100	100	100	2
HYDROCARBON PORE VOL ^{3,4}	2	4	10	13	14	2
Approx in place bcf		0.22	1.83	15.29	64.03	
Recov bcf at surface		39.1	320.6	2679.5	11221.9	
1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0 5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point						
TRAP DEPTH (in 1000 ft) (from sea level)	4	10	12	13	14	1
Surface to sea level correction (1000 ft):					0.246	

Uses oil POR*Sw
6

NONASSOCIATED GAS ACCUMULATION CHARACTERISTICS

NA Gas recovery factor %

Type of reservoir-drive (check any that apply):
 Water: Gas expansion:

Natural gas liquids plus condensate to non-associated gas (bbls/million cf) (in place):
 NGL-NAG=1.785*TD (at median)

Non-associated gas quality parameters:
 Hydrogen sulfide %
 CO2 contamination %
 Other inert gases:
 Name: Percent:
 Name: Percent:

Gas fvf Gas fvf= $752.2 \cdot (1 - \exp(-0.05728 \cdot TD))$ TD<=5.67 thous ft
 (at median depth) $113.3 + 21.1 \cdot TD - 0.812 \cdot TD^2 + 0.0116 \cdot TD^3$ 5.67<TD<=30
 TD=trap depth (thous ft)

TIME OF TRAP DEVELOPMENT

	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)	120	115	95
STRUCTURAL COMPONENT (Ma)			

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Table 9c: Input risking values for the Brookian Clinoform Central Play

NPRA Assessment Form-2001

Play: **Brookian Clinoform Central**

RISKING

MINIMUM ACCUMULATION SIZE, MAS (Millions of BBL in place)

50

PRERISKED FREQUENCY DISTRIBUTION (Oil plus Gas)

NUM OF PROSPECTS > MINIMUM SIZE	Est Shape	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		Min	50	5	Max	
	2	30	55	80	110	3

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

ATTRIBUTES

PLAY CHARGE (C)
ATTRIBUTES TRAP (T)
TIMING (F)

Probability that play contains at least 1 reservoir >= minimum size (CxTxF)

**PROBABILITY
OF FAVORABLE**

Computed

1
1
1

1

PROSPECT CHARGE (c)
ATTRIBUTES TRAP (t)
TIMING (f)

Probability that a randomly chosen prospect is favorable (cxtxf)

0.9
0.3
1

0.27

Play Attributes x Prospect Attributes (CxTxFxcxtxf)

0.27

FRACTION OF ACCUMULATIONS BEING OIL

Fraction NA Gas=1-Fraction(Oil)

0.5

0.5

Allocation (percent):

	Land	Oil	Gas
Federal	97	98	94
State	1	1	3
Native	2	1	3

Assessor's Name:

Dave Houseknecht

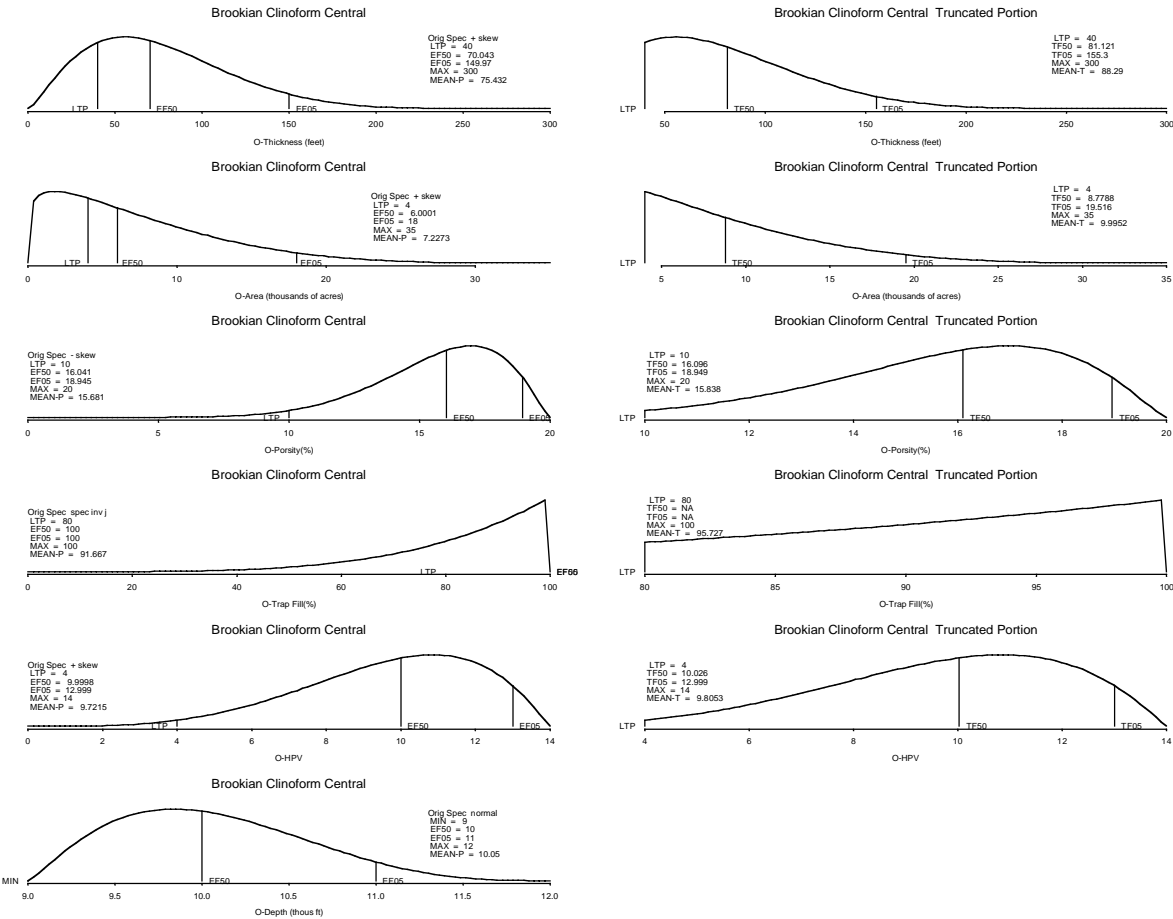
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10/19/01

Date of Simulation Run MM/DD/YYYY:

1/18/02

Table 9d: Distribution of fitted hydrocarbon volume attributes, trap depth, and number of prospects for the Brookian Clinoform Central Play



Brookian Clinoform Central

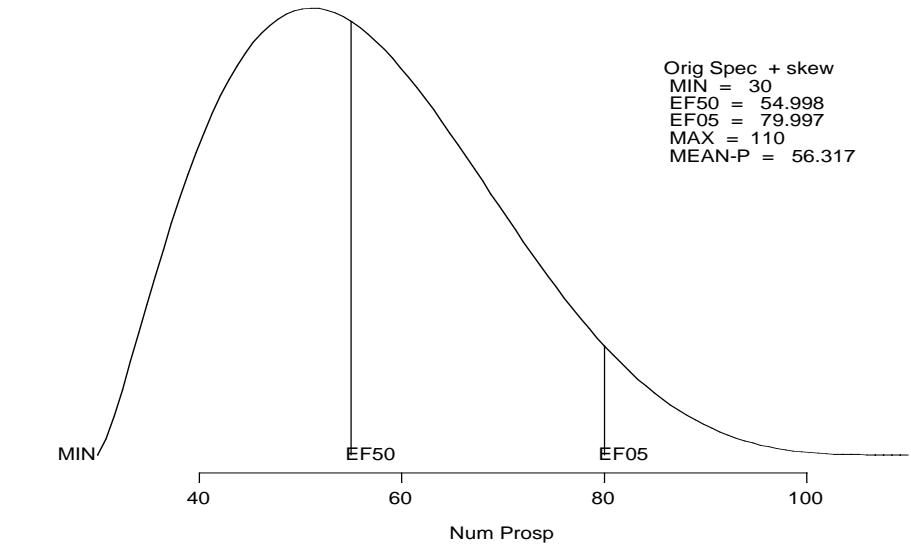
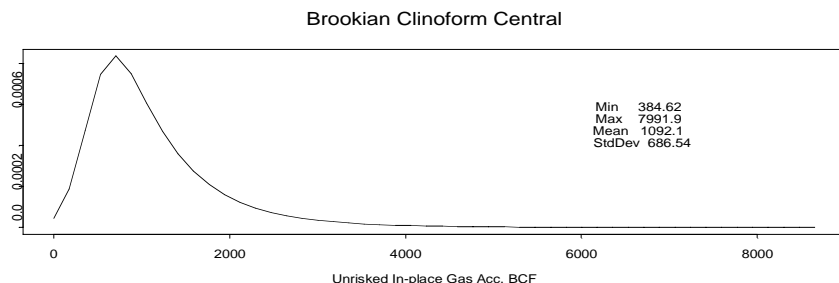
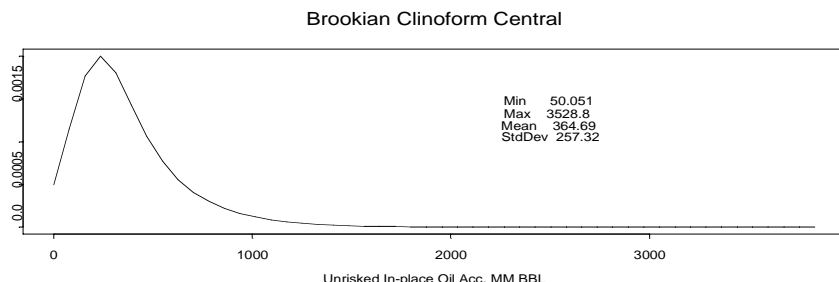


Table 9e: Estimated undiscovered oil and gas resources for the Brookian Clinoform Central Deposit



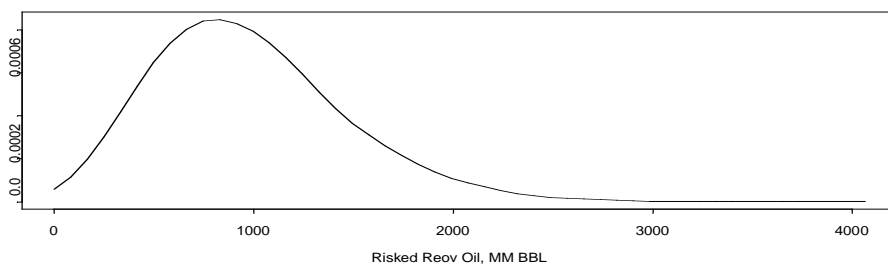
Play

Play Stats

Resource	Mean	StdDev	F95	F50	F05
In-place oil	2779.12	1361.81	853.59	2618.31	5282.73
In-place NA gas	8315.29	3900.45	2778.00	7860.89	15501.38
Recov oil	972.69	476.63	298.75	916.41	1848.96
Recov assoc diss gas	1230.43	602.86	378.59	1154.45	2335.82
Recov NA gas	5404.94	2535.29	1805.70	5109.58	10075.89
Recov NGL (ADG)	26.07	12.79	8.02	24.44	49.46
Recov NGL (NAG)	118.26	55.54	39.36	111.86	220.54
Num oil deposits	7.62	3.16	3.00	7.00	13.00
Num NA gas deposits	7.61	3.13	3.00	7.00	13.00

RNS=77

Play Totals Brookian Clinoform Central



Play Totals Brookian Clinoform Central

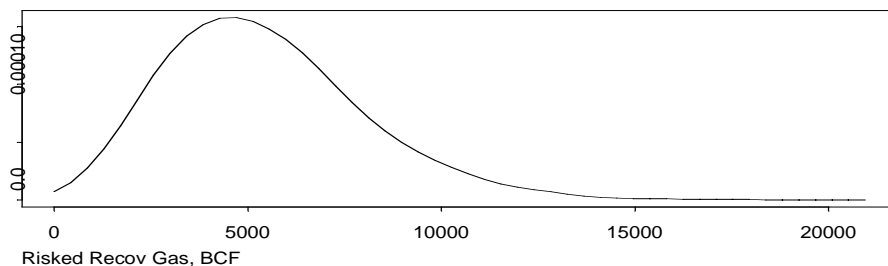


Table 9f: Estimated undiscovered oil and gas resources for the Brookian Clinoform Central Play showing number of deposits and volumes by accumulation size class

Start size class	Oil deposits	Oil (MMBO)	Start size class	Gas deposits	Gas (BCFG)
0	0.00	0.00	0	0.00	0.00
8	0.00	0.00	48	0.00	0.00
16	0.24	6.51	96	0.00	0.00
32	1.59	78.22	192	1.75	553.41
64	2.96	275.68	384	3.42	1883.98
128	2.16	381.29	768	2.01	2093.69
256	0.63	208.94	1536	0.42	822.99
512	0.04	21.71	3072	0.01	51.42
1024	0.00	0.45			
Totals	7.62	972.79		7.61	5405.48

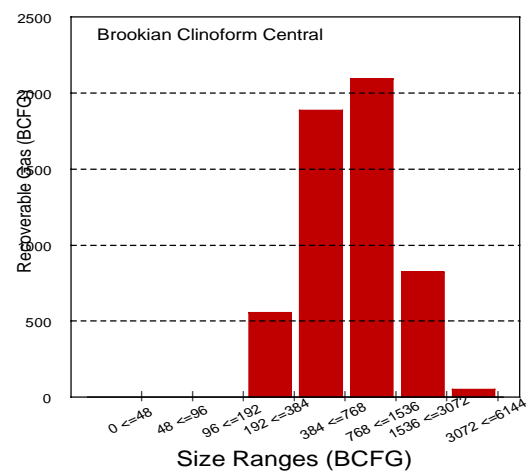
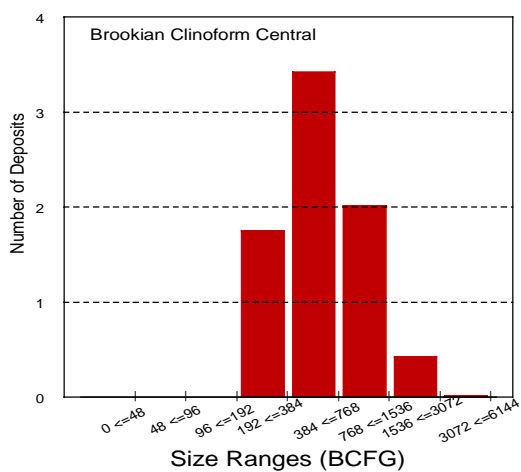
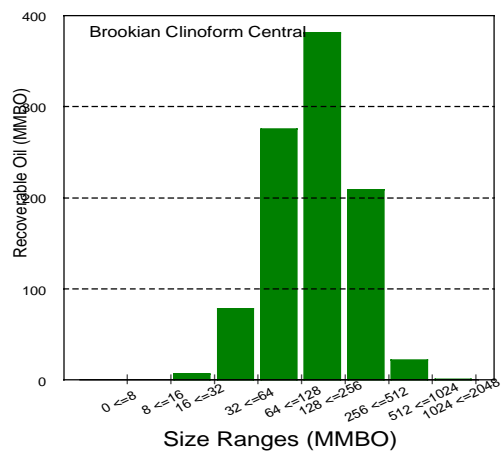
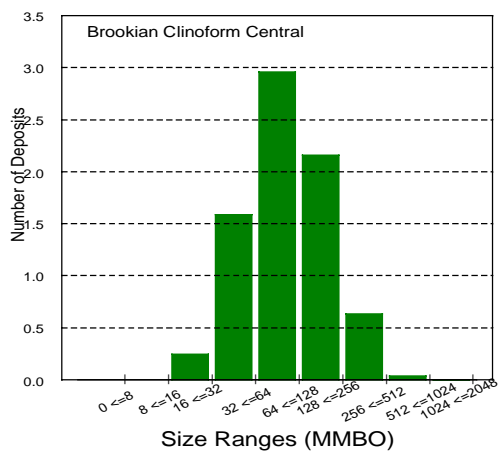


Table 10a: Input values for oil accumulations in the Brookian Clinoform South Shallow Play
NPRA Assessment Form-2001

PLAY:	Brookian Clinoform South Shallow
Play area:	7491 10 ³ Acres

OIL ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		LTP	0.50	0.05	Max	
NET RESERVOIR THICKNESS ¹	2	50	75	200	400	2
AREA OF CLOSURE ²	2	5	7	20	40	2
POROSITY ^{3,4}	4	10	14	18	20	2
TRAP FILL ³	7	80	100	100	100	2
HYDROCARBON PORE VOL ^{3,4}	4	4	8	12	14	6
Approx mm bbl (fvf=1)		62.1	325.8	3723.8	17377.9	
Recov mm bbl at surface		14.1	74.2	848.1	3958.0	

1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

TRAP DEPTH (in 1000 ft)	2	3	6	9	10	1
(from sea level)	Surface to sea level correction (1000 ft):				1.044	

OIL ACCUMULATION CHARACTERISTICS

Oil recovery factor %

Type of reservoir-drive (check any that apply):

Water: Depletion: Gas expansion:

FVF (Formation volume factor, rb/stb): (at median depth) FVF=0.972+0.000147*F^{1.175}

Pressure(psi)	3000	P=TD*0.5*1000	TD=trap depth (thous ft), P=pressure (psi)
temp(deg F)	144	T=19*TD+30	T=temp deg F
SolGasGr	0.711	LN is log base e	
F	739	SGG=((0.1402*LN(C27+14.7)-0.4227)+(0.1369*LN(C28)+0.0156)+(0.1704*LN(E3 AG=API gravity	

Uncorrected GOR=SGG*((P+14.7)*10^(0.0125*AG))/(18*10^(0.00091*T))^(1/0.83)
F= Final GOR*(SGG/OG)^0.5+1.25*T OG=141.5/(131.5+AG)

GOR (Associated gas to oil ratio, cu.ft./bbl, at stp): Final GOR at median depth
 Uncorrected GOR

NGLR (Natural gas liquids to associated gas ratio, bbls/million cu.ft., at stp)= 4.5985*exp(.1711*TD) (median depth)

Oil quality parameters:

API gravity	<input type="text" value="32"/>	Oil Grav (ratio)	<input type="text" value="0.865"/>
Sulfur content of oil	<input type="text" value="1.2"/>		

Associated gas quality parameters:

Hydrogen sulfide %	<input type="text" value="0"/>
CO2 contamination %	<input type="text" value="0"/>

Other inert gases:

Name:	<input type="text"/>	Percent:	<input type="text"/>
Name:	<input type="text"/>	Percent:	<input type="text"/>

	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)	120	115	95
STRUCTURAL COMPONENT (Ma)			

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Note: only enter play name and assessor's name on Oil worksheet

Table 10b: Input values for nonassociated gas accumulations in the Brookian Clinoform South Shallow Play
NPRA Assessment Form-2001

PLAY: Brookian Clinoform South Shallow

NONASSOCIATED GAS ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		LTP	50	5	Max	
NET RESERVOIR THICKNESS ¹	2	50	75	200	400	2
AREA OF CLOSURE ²	2	5	7	20	40	2
POROSITY ^{3,4}	4	10	14	18	20	2
TRAP FILL ³	7	80	100	100	100	2
HYDROCARBON PORE VOL ^{3,4}	4	4	8	12	14	2
Approx in place bcf		0.35	1.83	20.91	97.57	
Recov bcf at surface		57.7	302.9	3461.6	16153.9	
1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0 5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point						
TRAP DEPTH (in 1000 ft)	4	6	10	13	14	1
(from sea level)	Surface to sea level correction (1000 ft):				1.044	

Uses oil POR*Sw
6

NONASSOCIATED GAS ACCUMULATION CHARACTERISTICS

NA Gas recovery factor % 65

Type of reservoir-drive (check any that apply):

Water: ☐

Gas expansion: ☐

Natural gas liquids plus condensate to non-associated gas (bbls/million cf) (in place):

NGL-NAG=1.785*TD 17.9 (at median)

Non-associated gas quality parameters:

Hydrogen sulfide %

CO2 contamination %

Other inert gases:

Name:

Percent:

Name:

Percent:

Gas fvf 254.7 Gas fvf= $752.2 \cdot (1 - \exp(-0.05728 \cdot TD))$ TD<=5.67 thous ft
(at median depth) $113.3 + 21.1 \cdot TD - 0.812 \cdot TD^2 + 0.0116 \cdot TD^3$ 5.67<TD<=30
TD=trap depth (thous ft)

TIME OF TRAP DEVELOPMENT	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)			
STRUCTURAL COMPONENT (Ma)			

Assessor's Name: Fred Geoknow

Date of Data Entry MM/DD/YYYY: 1/1/00

Date of Simulation Run MM/DD/YYYY: 1/1/00

Table 10c: Input risking values for the Brookian Clinoform South Shallow Play

NPRA Assessment Form-2001

Play: **Brookian Clinoform South Shallow**

RISKING

MINIMUM ACCUMULATION SIZE, MAS (Millions of BBL in place) 50

PRERISKED FREQUENCY DISTRIBUTION (Oil plus Gas)

	PROB OF AND GREATER THAN					Knowledge Level 1-3 ⁵
NUM OF PROSPECTS	Est Shape	Min	50	5	Max	
> MINIMUM SIZE	2	20	40	60	100	3

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

ATTRIBUTES

PLAY CHARGE (C)
 ATTRIBUTES TRAP (T)
 TIMING (F)
Probability that play contains at least 1 reservoir >= minimum size (CxTxF)

PROBABILITY OF FAVORABLE

Computed

1
1
1
1

PROSPECT CHARGE (c)
 ATTRIBUTES TRAP (t)
 TIMING (f)
Probability that a randomly chosen prospect is favorable (cxtxf)

0.7
0.2
1
0.14

0.8
0.3
1

Play Attributes x Prospect Attributes (CxTxFxcxtxf) 0.14

FRACTION OF ACCUMULATIONS BEING OIL 0.5
Fraction NA Gas=1-Fraction(Oil) 0.5

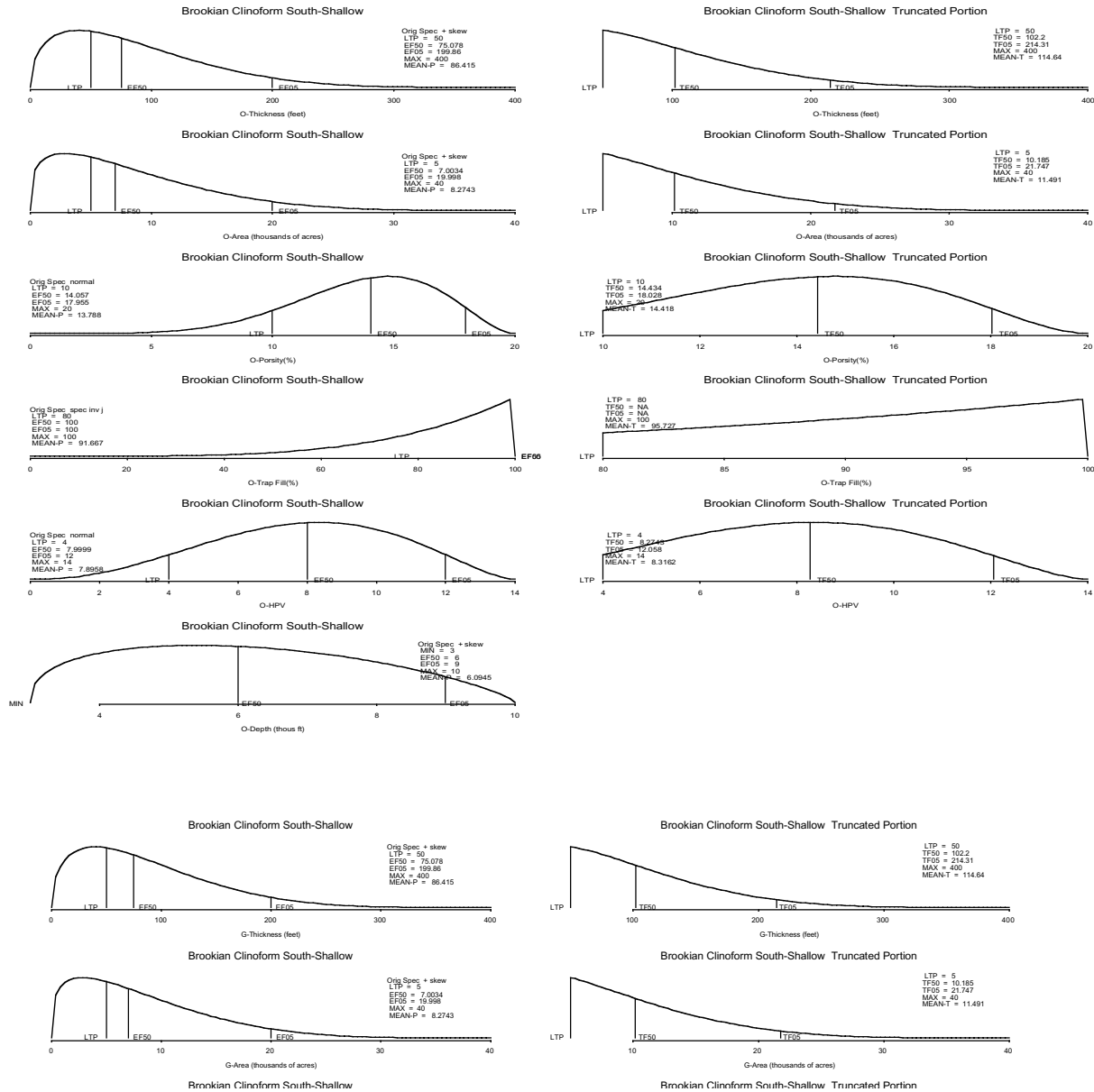
Allocation (percent):		Land	Oil	Gas
	Federal	99	100	100
	State	0	0	0
	Native	1	0	0

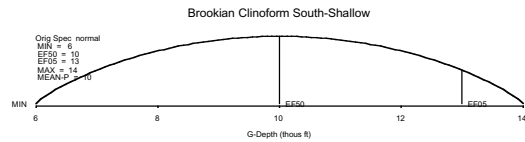
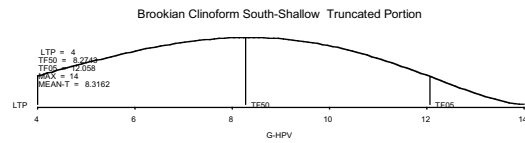
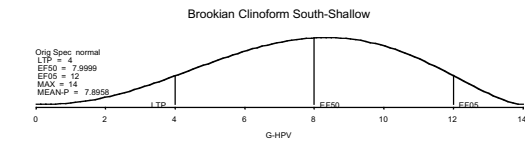
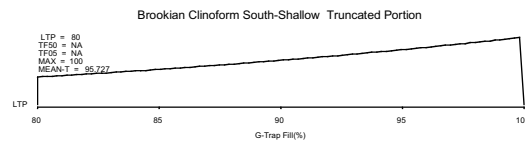
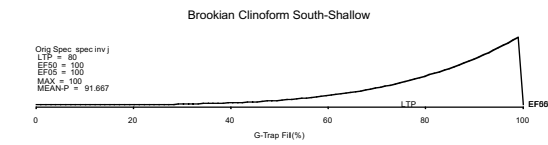
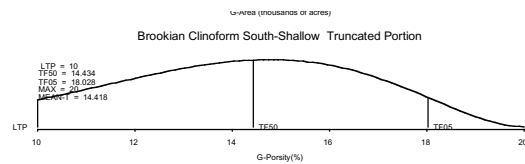
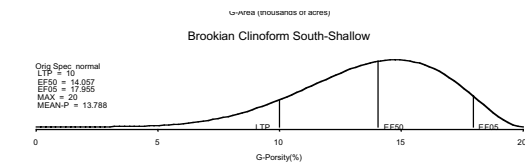
Assessor's Name: Dave Houseknecht

Date of Data Entry MM/DD/YYYY: 10/19/01

Date of Simulation Run MM/DD/YYYY: 1/18/02

Table 10d: Distribution of fitted hydrocarbon volume attributes, trap depth, and number of prospects for the Brookian Clinoform South Shallow Play





Brookian Clinoform South-Shallow

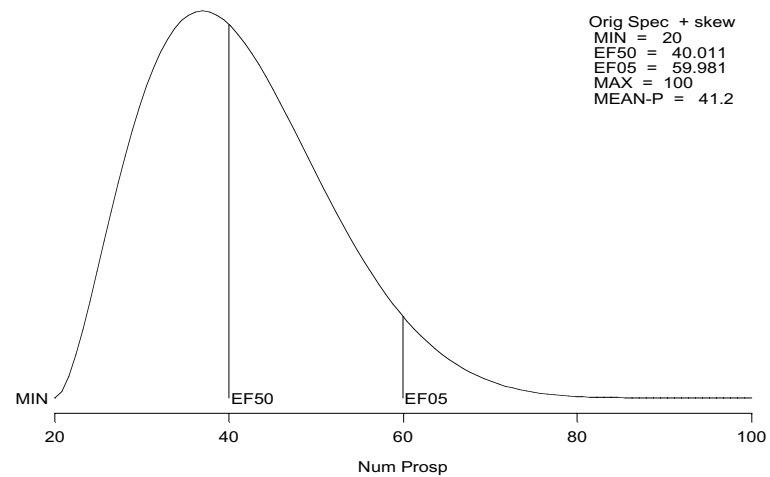
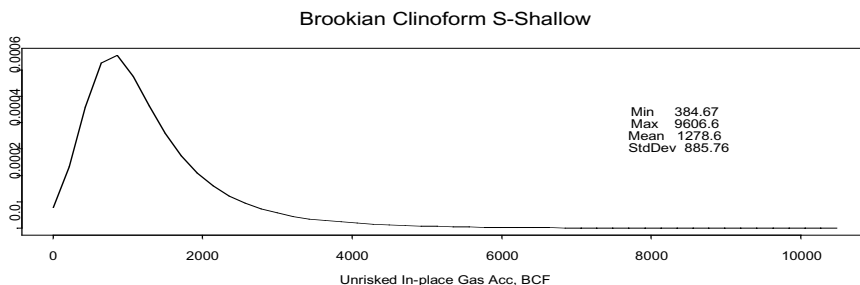
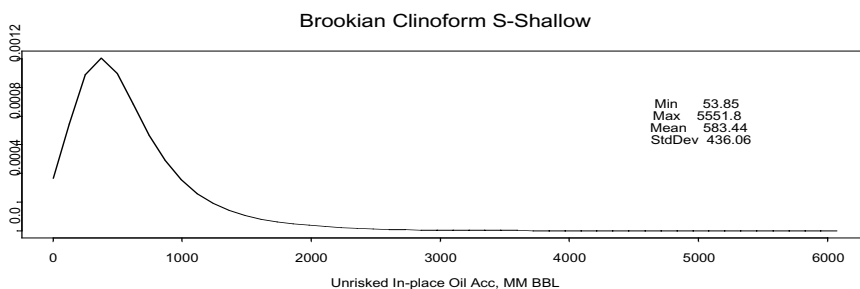


Table 10e: Estimated undiscovered oil and gas resources for the Brookian Clinoform S-Shallow Play Deposit



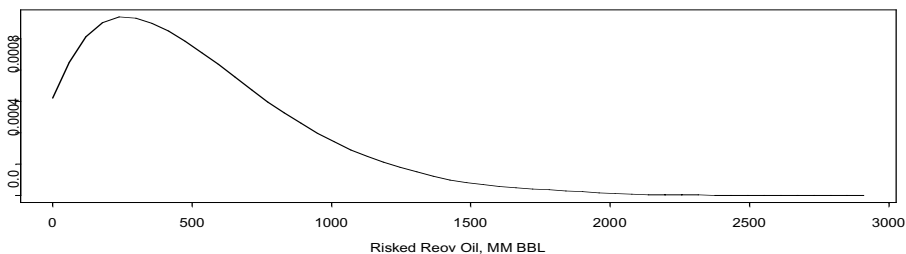
Play

Play Stats

Resource	Mean	StdDev	F95	F50	F05
In-place oil	1692.03	1295.53	0.00	1433.27	4178.98
In-place NA gas	3699.35	2757.00	0.00	3175.92	8936.19
Recov oil	507.61	388.66	0.00	429.98	1253.70
Recov assoc diss gas	362.10	279.09	0.00	308.34	907.46
Recov NA gas	2404.58	1792.05	0.00	2064.34	5808.52
Recov NGL (ADG)	8.08	6.30	0.00	6.80	20.31
Recov NGL (NAG)	47.87	36.36	0.00	40.81	117.36
Num oil deposits	2.90	1.81	0.00	3.00	6.00
Num NA gas deposits	2.89	1.79	0.00	3.00	6.00

RNS=341

Play Totals Brookian Clinoform S-Shallow



Play Totals Brookian Clinoform S-Shallow

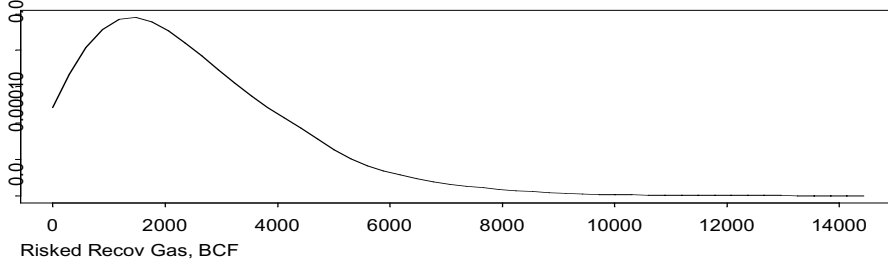


Table 10f: Estimated undiscovered oil and gas resources for the Brookian Clinoform S-shallow Play showing number of deposits and volumes by accumulation size class

Start size class	Oil deposits	Oil (MMBO)	Start size class	Gas deposits	NA Gas (BCFG)
0	0.00	0.00	0	0.00	0.00
8	0.00	0.00	48	0.00	0.00
16	0.03	0.87	96	0.00	0.00
32	0.35	17.73	192	0.51	163.06
64	0.94	88.62	384	1.20	670.31
128	1.03	186.67	768	0.89	939.50
256	0.47	160.12	1536	0.27	537.10
512	0.08	50.58	3072	0.03	93.61
	0.00	3.08		0.00	1.24
Totals	2.90	507.66		2.89	2404.82

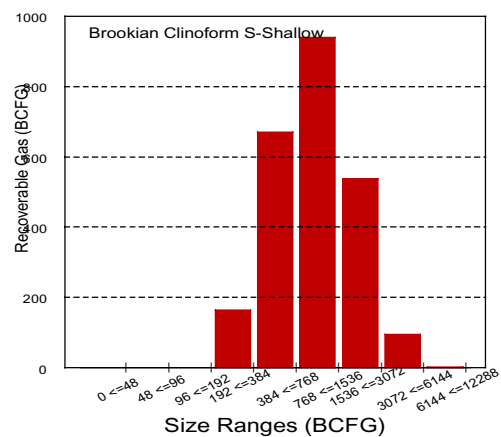
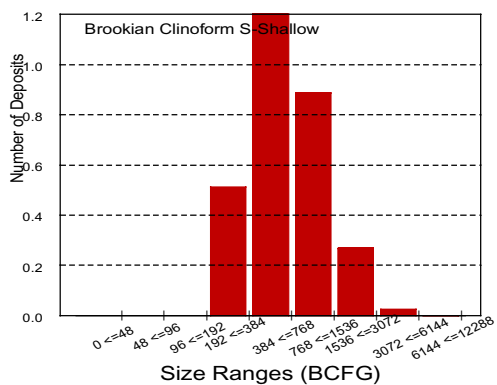
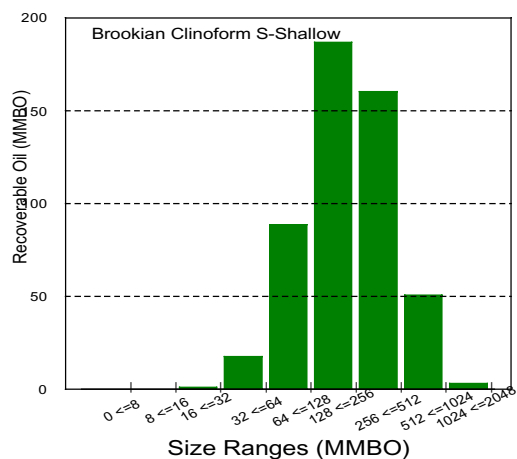
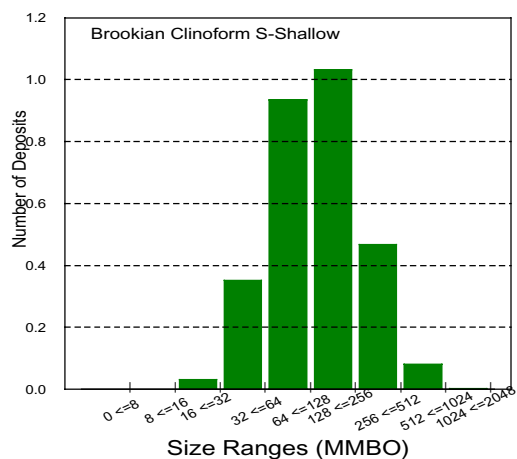


Table 11a: Input values for nonassociated gas accumulations in the Brookian Clinoform South Deep Play
NPRA Assessment Form-2001

PLAY: **Brookian Clinoform South Deep**

Play area: 7491 10³ Acres

NONASSOCIATED GAS ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		LTP	50	5	Max	
NET RESERVOIR THICKNESS ¹	2	50	75	200	400	2
AREA OF CLOSURE ²	2	5	7	20	40	2
POROSITY ^{3,4}	4	8	11	14	17	2
TRAP FILL ³	7	80	100	100	100	2
HYDROCARBON PORE VOL ^{3,4}	4	2	5	8	11	
Approx in place bcf		0.17	1.14	13.94	76.67	
Recov bcf at surface		32.4	212.8	2593.6	14264.6	
1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0 5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point						
TRAP DEPTH (in 1000 ft)	2	11	15	20	24	
(from sea level)	Surface to sea level correction (1000 ft):				1.044	

NONASSOCIATED GAS ACCUMULATION CHARACTERISTICS

NA Gas recovery factor % 65

Type of reservoir-drive (check any that apply):

Water: ☐

Gas expansion: ☒

Natural gas liquids plus condensate to non-associated gas (bbbls/million cf) (in place):

NGL-NAG=1.785*TD 26.8 (at median)

Non-associated gas quality parameters:

Hydrogen sulfide %

CO2 contamination %

Other inert gases:

Name:

Percent:

Name:

Percent:

Gas fvf 286.3 Gas fvf= 752.2*(1-EXP(-0.05728*TD)) TD<=5.67 thous ft
(at median depth) 113.3+21.1*TD-0.812*TD^2+0.0116*TD^3 5.67<TD<=30
TD=trap depth (thous ft)

TIME OF TRAP DEVELOPMENT

	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)	120	115	95
STRUCTURAL COMPONENT (Ma)			

Assessor's Name: Dave Houseknecht

Date of Data Entry MM/DD/YYYY: 10/19/01

Date of Simulation Run MM/DD/YYYY: 1/18/02

Table 11b: Input risking values for the Brookian Clinoform South Deep Play **NPRA Assessment Form-2001**

Play: **Brookian Clinoform South Deep**

RISKING

MINIMUM ACCUMULATION SIZE, MAS (recov bcf)

250

PRERISKED FREQUENCY DISTRIBUTION (Oil plus Gas)

NUM OF PROSPECTS > MINIMUM SIZE	PROB OF AND GREATER THAN					Knowledge Level 1-3 ⁵
	Est Shape	Min	50	5	Max	
	2	30	50	80	120	3

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

ATTRIBUTES

PLAY
ATTRIBUTES

CHARGE (C)
TRAP (T)
TIMING (F)

Probability that play contains at least 1 reservoir >= minimum size (CxTxF)

PROBABILITY OF FAVORABLE

Computed

1
0.8
1

0.8

PROSPECT
ATTRIBUTES

CHARGE (c)
TRAP (t)
TIMING (f)

Probability that a randomly chosen prospect is favorable (cxtxf)

0.7
0.2
1

0.14

Play Attributes x Prospect Attributes (CxTxFxcxtxf)

0.112

FRACTION OF ACCUMULATIONS BEING OIL

Fraction NA Gas=1-Fraction(Oil)

0

1

Allocation (percent):

	Land	Oil	Gas
Federal	99		100
State	0		0
Native	1		0

Assessor's Name:

Dave Houseknecht

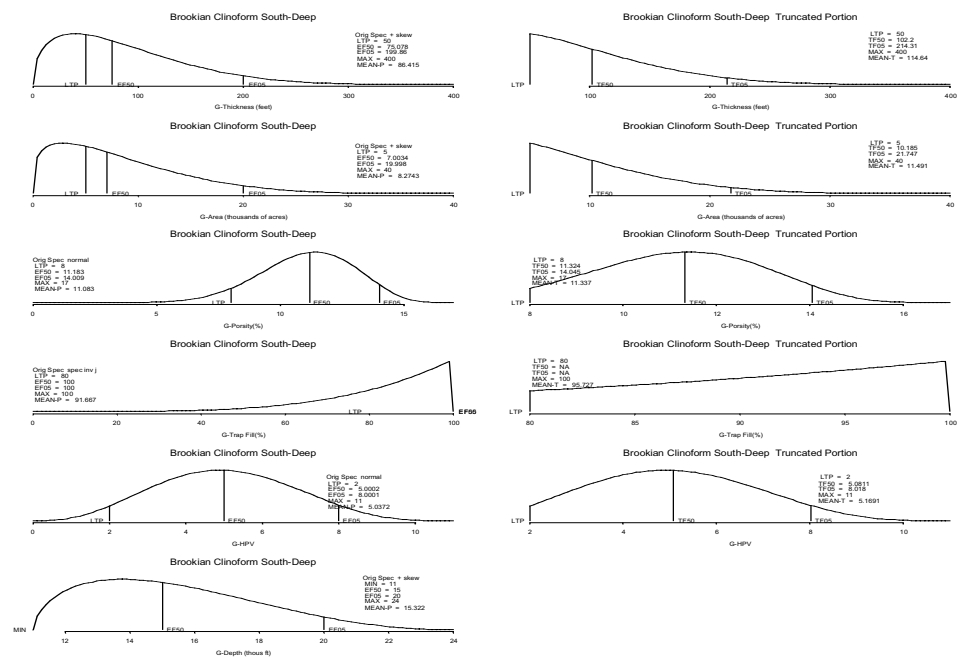
Date of Data Entry MM/DD/YYYY:

10/19/01

Date of Simulation Run MM/DD/YYYY:

1/18/02

Table 11c: Distribution of fitted hydrocarbon volume attributes, trap depth, and number of prospects for the Brookian Clinoform South-Deep Play



Brookian Clinoform South-Deep

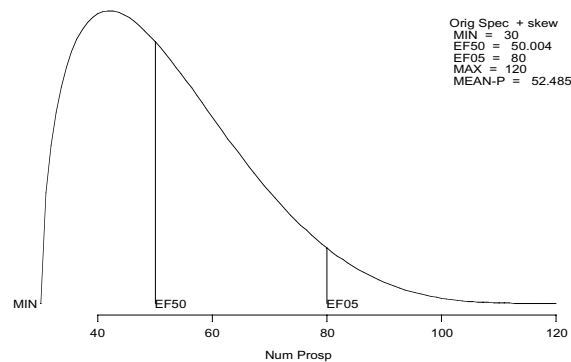
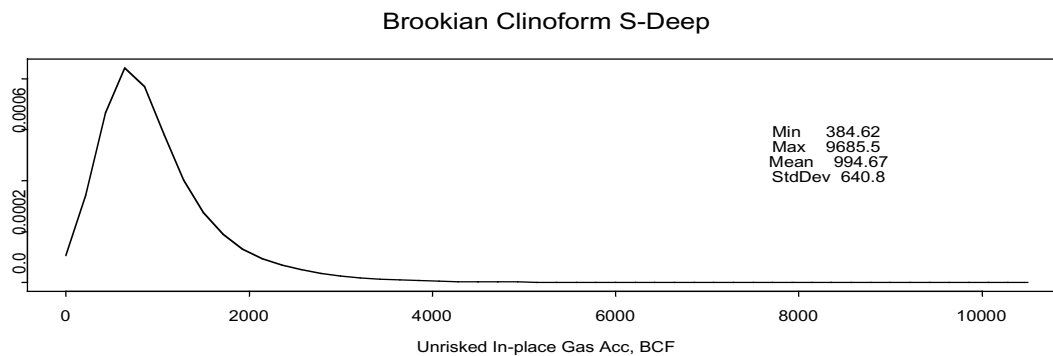


Table 11d: Estimated undiscovered oil and gas resources for the Brookian Clinoform S-Deep Play Deposit



Play

Play Stats

Resource	Mean	StdDev	F95	F50	F05
In-place oil					
In-place NA gas	5827.81	4374.21	0.00	5703.46	13531.67
Recov oil					
Recov assoc diss gas					
Recov NA gas	3788.08	2843.24	0.00	3707.25	8795.58
Recov NGL (ADG)					
Recov NGL (NAG)	111.40	84.27	0.00	108.53	259.42
Num oil deposits					
Num NA gas deposits	5.86	4.11	0.00	6.00	13.00

RNS=87

Play Totals Brookian Clinoform S-Deep

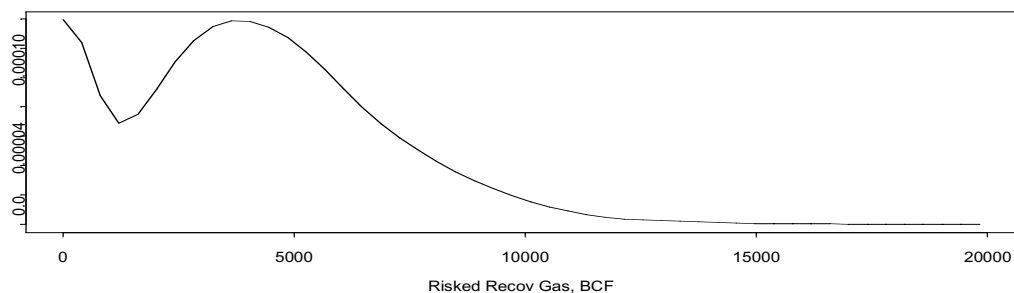


Table 11e: Estimated undiscovered oil and gas resources for the Brookian Clinoform S-Deep Play showing number of deposits and volumes by accumulation size class

Start size class	Oil deposits	Oil (MMBO)	Start size class	Gas deposits	NA Gas (BCFG)
0			0	0.00	0.00
8			48	0.00	0.00
16			96	0.00	0.00
32			192	1.69	530.09
64			384	2.66	1442.62
128			768	1.26	1305.48
256			1536	0.25	475.74
512			3072	0.01	33.95
				0.00	0.50
Totals	0.00	0.00		5.86	3788.38

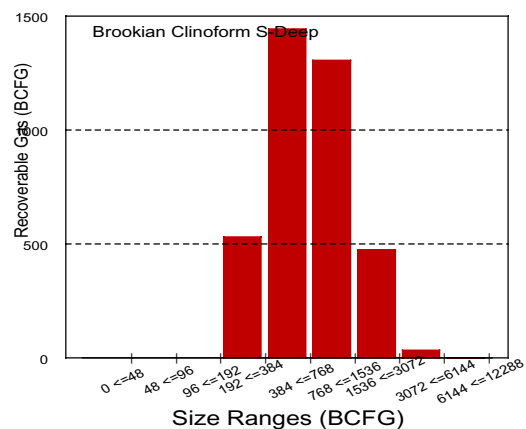
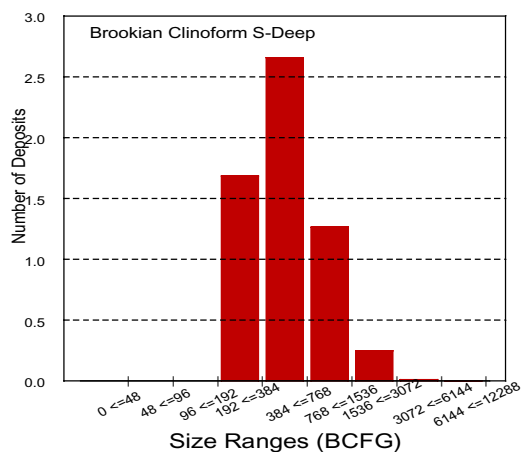


Table 12a: Input values for oil accumulations in the Beaufortian Cretaceous Topset North Play
NPRA Assessment Form-2001

PLAY:	Beaufortian Cretaceous Topset North
Play area:	7,879 10 ³ Acres

OIL ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		LTP	0.50	0.05	Max	
NET RESERVOIR THICKNESS ¹	2	15	20	30	100	2
AREA OF CLOSURE ²	2	4	5	10	50	3
POROSITY ^{3,4}	4	15	18	20	22	2
TRAP FILL ³	6	50	75	99	100	2
HYDROCARBON PORE VOL ^{3,4}	3	10	13	15	17	5
Approx mm bbl (fvf=1)		23.3	75.6	345.6	6594.3	
Recov mm bbl at surface		5.7	18.7	85.2	1626.2	

1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

TRAP DEPTH (in 1000 ft)	3	3	8	9	10	1
(from sea level)	Surface to sea level correction (1000 ft):				0.107	

OIL ACCUMULATION CHARACTERISTICS

Oil recovery factor %

Type of reservoir-drive (check any that apply):

Water: Depletion: Gas expansion:

FVF (Formation volume factor, rb/stb): (at median depth) FVF=0.972+0.000147*F^{1.175}

Pressure(psi)	4000	P=TD*0.5*1000	TD=trap depth (thous ft), P=pressure (psi)
temp(deg F)	182	T=19*TD+30	T=temp deg F LN is log base e
SolGasGr	0.732	SGG=((0.1402*LN(C27+14.7)-0.4227)+(0.1369*LN(C28)+0.0156)+(0.1704*LN(E37 AG=API gravity	
F	921	Uncorrected GOR=SGG*((P+14.7)*10^(0.0125*AG))/(18*10^(0.00091*T)))^(1/0.83)	
		F= Final GOR*(SGG/OG)^0.5+1.25*T OG=141.5/(131.5+AG)	

GOR (Associated gas to oil ratio, cu.ft./bbl, at stp): Final GOR at median depth
 Uncorrected GOR

NGLR (Natural gas liquids to associated gas ratio, bbls/million cu.ft., at stp)= 4.5985*exp(.1711*TD) (median depth)

Oil quality parameters: assumes mixture of Shublik + Kingak +/- GRZ

API gravity Oil Grav (ratio)

Sulfur content of oil

Associated gas quality parameters:

Hydrogen sulfide %

CO2 contamination %

Other inert gases:

Name: Percent:

Name: Percent:

TIME OF TRAP DEVELOPMENT

	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)			
STRUCTURAL COMPONENT (Ma)			

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Note: only enter play name and assessor's name on Oil worksheet

Table 12b: Input values for nonassociated gas accumulations in the Beaufortian Cretaceous Topset North Play
NPRA Assessment Form-2001

PLAY: Beaufortian Cretaceous Topset North

NONASSOCIATED GAS ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		LTP	50	5	Max	
NET RESERVOIR THICKNESS ¹	2	15	20	30	100	2
AREA OF CLOSURE ²	2	4	5	10	50	3
POROSITY ^{3,4}	4	15	18	20	22	2
TRAP FILL ³	6	50	75	99	100	2
HYDROCARBON PORE VOL ^{3,4}	3	10	13	15	17	
Approx in place bcf		0.13	0.42	1.94	37.03	
Recov bcf at surface		21.6	70.2	320.7	6118.5	
1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0						
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point						
TRAP DEPTH (in 1000 ft)	3	3	8	9	10	1
(from sea level)	Surface to sea level correction (1000 ft):				0.107	

NONASSOCIATED GAS ACCUMULATION CHARACTERISTICS

NA Gas recovery factor %

Type of reservoir-drive (check any that apply):
 Water: Gas expansion:

Natural gas liquids plus condensate to non-associated gas (bbls/million cf) (in place):
 NGL-NAG=1.785*TD (at median)

Non-associated gas quality parameters:
 Hydrogen sulfide %
 CO2 contamination %
 Other inert gases:
 Name: Percent:
 Name: Percent:

Gas fvf Gas fvf= $752.2 \cdot (1 - \exp(-0.05728 \cdot TD))$ TD<=5.67 thous ft
 (at median depth) $113.3 + 21.1 \cdot TD - 0.812 \cdot TD^2 + 0.0116 \cdot TD^3$ 5.67<TD<=30
 TD=trap depth (thous ft)

TIME OF TRAP DEVELOPMENT

	BEGIN	PEAK	END
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STRUCTURAL COMPONENT (Ma)	<input type="text"/>	<input type="text"/>	<input type="text"/>

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Table 12c: Input risking values for the Beaufortian Cretaceous Topset North Play
NPRA Assessment Form-2001

Play: **Beaufortian Cretaceous Topset North**

RISKING

MINIMUM ACCUMULATION SIZE, MAS (Millions of BBL in place)

50

PRERISKED FREQUENCY DISTRIBUTION (Oil plus Gas)

NUM OF PROSPECTS > MINIMUM SIZE	PROB OF AND GREATER THAN					Knowledge Level 1-3 ⁵
	Est Shape	Min	50	5	Max	
	2	15	30	45	90	3

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

ATTRIBUTES

PLAY CHARGE (C)
 ATTRIBUTES TRAP (T)
 TIMING (F)

Probability that play contains at least 1 reservoir >= minimum size (CxTxF)

PROBABILITY OF FAVORABLE

Computed

1
0.9
1

0.9

PROSPECT CHARGE (c)
 ATTRIBUTES TRAP (t)
 TIMING (f)

Probability that a randomly chosen prospect is favorable (cxtxf)

0.8
0.2
1

0.16

Play Attributes x Prospect Attributes (CxTxFcxtxf)

0.144

FRACTION OF ACCUMULATIONS BEING OIL

Fraction NA Gas=1-Fraction(Oil)

0.7

0.3

Allocation (percent):

	Land	Oil	Gas
Federal	82	75	78
State	11	16	14
Native	7	9	8

Assessor's Name:

Dave Houseknecht

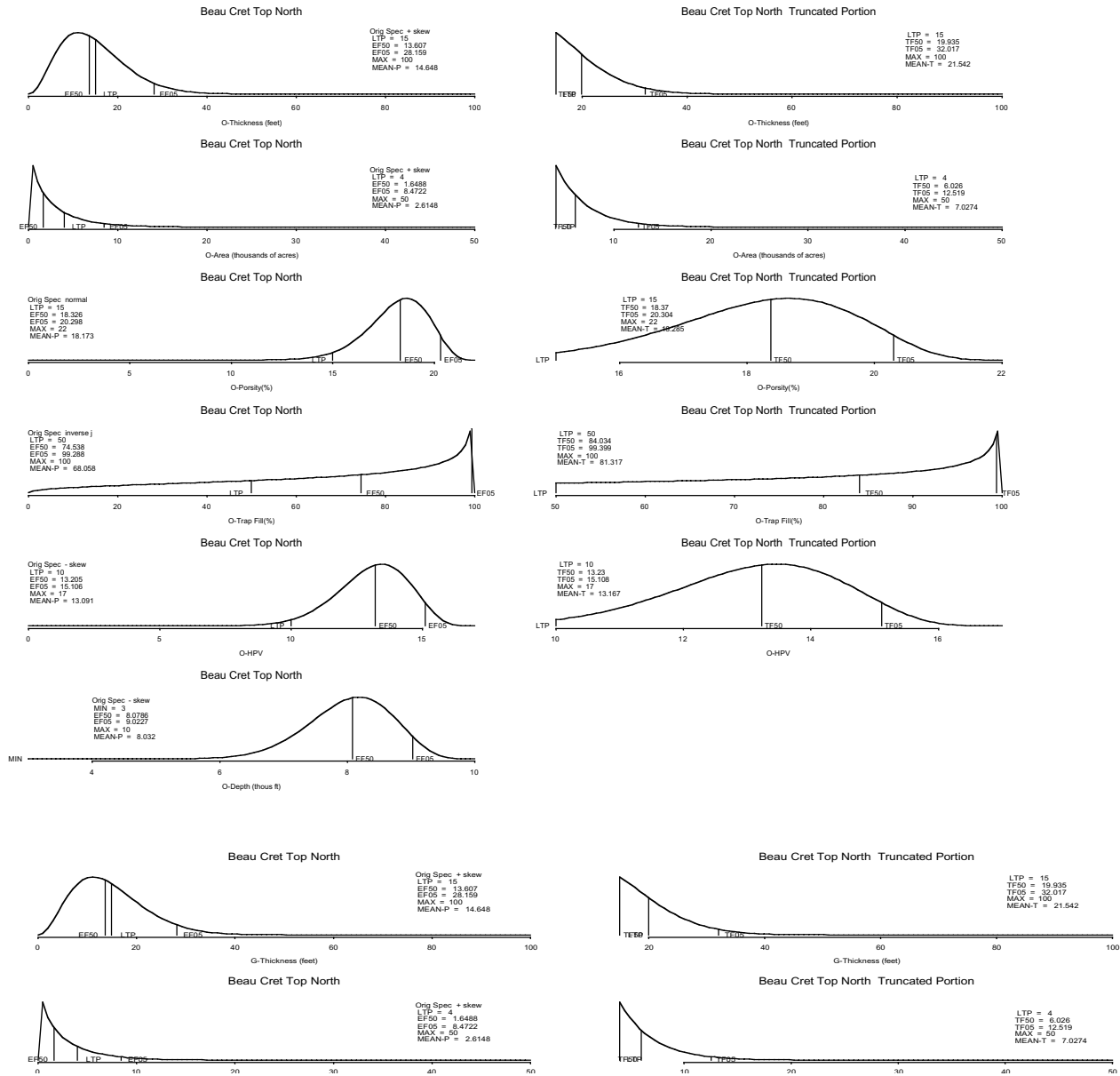
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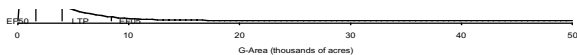
10/19/01

Date of Simulation Run MM/DD/YYYY:

1/19/02

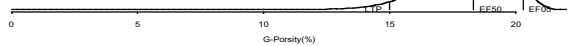
Table 12d: Distribution of fitted hydrocarbon volume attributes, trap depth, and number of prospects for the Beaufortian Cretaceous Topset North Play





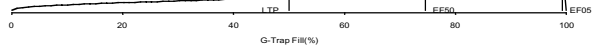
Beau Cret Top North

Orig Spec - normal
LTP = 15
EF50 = 18.326
EF05 = 20.298
MAX = 22
MEAN-P = 18.173



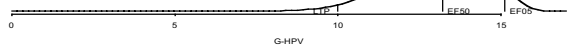
Beau Cret Top North

Orig Spec - inverse j
LTP = 50
EF50 = 74.538
EF05 = 99.288
MAX = 100
MEAN-P = 68.058



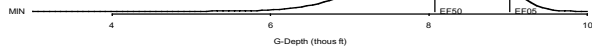
Beau Cret Top North

Orig Spec - skew
LTP = 10
EF50 = 13.205
EF05 = 15.108
MAX = 17
MEAN-P = 13.091

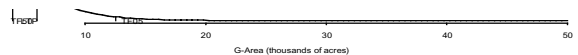


Beau Cret Top North

Orig Spec - skew
MIN = 3
EF50 = 8.0786
EF05 = 9.0227
MAX = 10
MEAN-P = 8.032

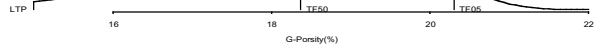


Beau Cret Top North



Beau Cret Top North Truncated Portion

LTP = 15
TF50 = 18.37
TF05 = 20.304
MAX = 22
MEAN-T = 18.285



Beau Cret Top North Truncated Portion

LTP = 50
TF50 = 84.034
TF05 = 99.999
MAX = 100
MEAN-T = 81.317



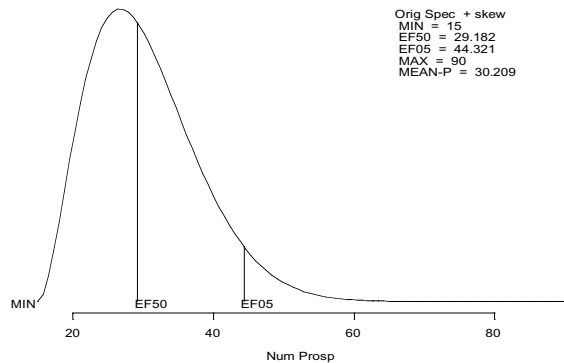
Beau Cret Top North Truncated Portion

LTP = 10
TF50 = 13.23
TF05 = 15.108
MAX = 17
MEAN-T = 13.167



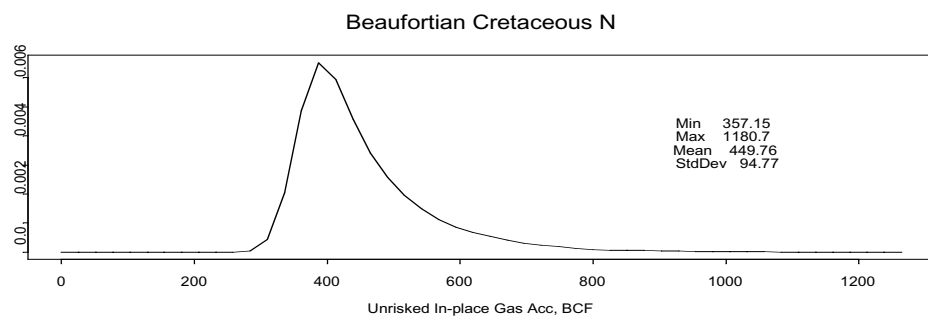
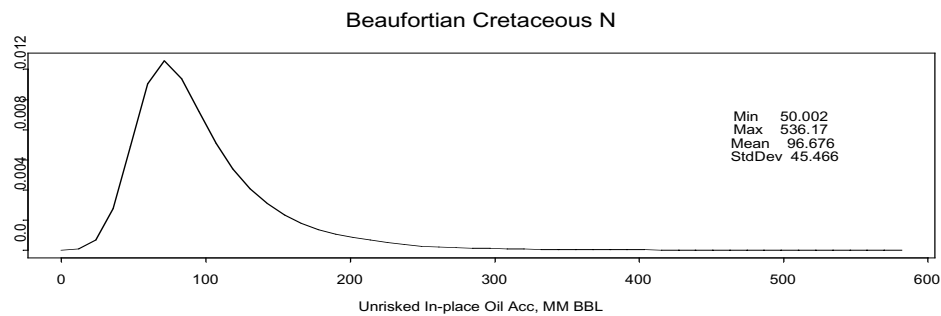
Beau Cret Top North

Beau Cret Top North



Orig Spec - skew
MIN = 15
EF50 = 29.182
EF05 = 44.321
MAX = 90
MEAN-P = 30.209

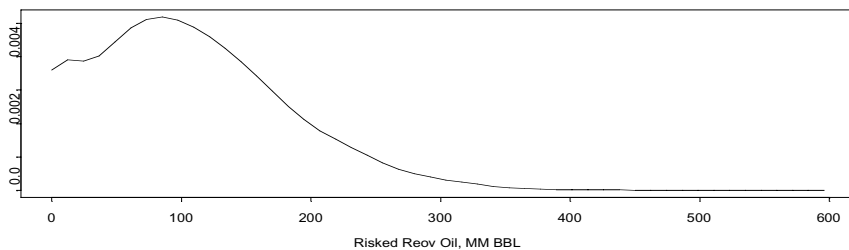
Table 12e: Estimated undiscovered oil and gas resources for the Beaufortian Cretaceous Topset North Play
Deposit



Play					
Play Stats					
Resource	Mean	StdDev	F95	F50	F05
In-place oil	294.46	214.94	0.00	271.55	683.52
In-place NA gas	577.86	567.08	0.00	439.19	1659.80
Recov oil	103.06	75.23	0.00	95.04	239.23
Recov assoc diss gas	79.19	57.87	0.00	72.82	184.32
Recov NA gas	404.50	396.96	0.00	307.43	1161.86
Recov NGL (ADG)	1.91	1.40	0.00	1.76	4.46
Recov NGL (NAG)	5.93	5.83	0.00	4.56	17.07
Num oil deposits	3.05	2.07	0.00	3.00	7.00
Num NA gas deposits	1.28	1.24	0.00	1.00	4.00

RNS = 442

Play Totals Beaufortian Cretaceous Topset N



Play Totals Beaufortian Cretaceous Topset N

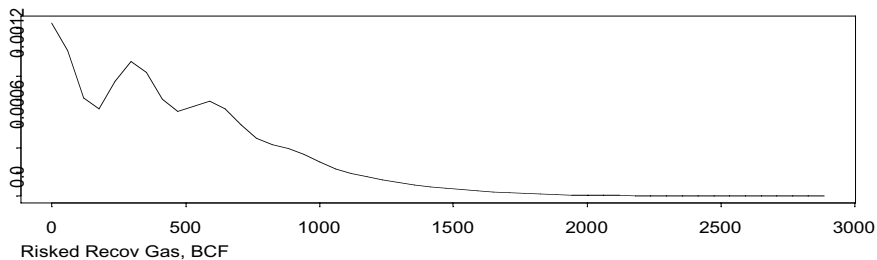


Table 12f: Estimated undiscovered oil and gas resources for the Beaufortian Cretaceous Topset North Play showing number of deposits and volumes by accumulation size class

Start size class	Oil deposits	Oil (MMBO)	Start size class	Gas deposits	NA Gas (BCFG)
0	0.00	0.00	0	0.00	0.00
8	0.00	0.00	48	0.00	0.00
16	1.79	43.07	96	0.00	0.00
32	1.09	46.72	192	1.12	329.79
64	0.16	12.61	384	0.16	74.46
128	0.00	0.66	768	0.00	0.29
256			1536		
Totals	3.05	103.07		1.28	404.53

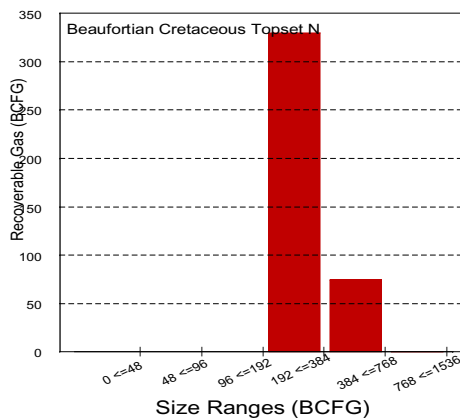
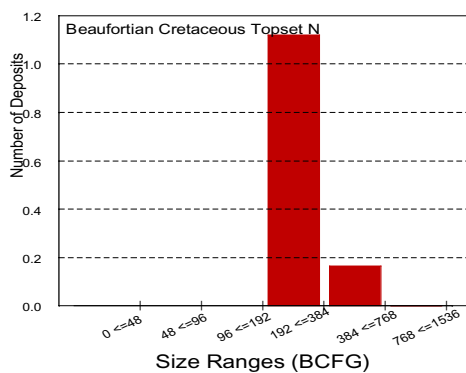
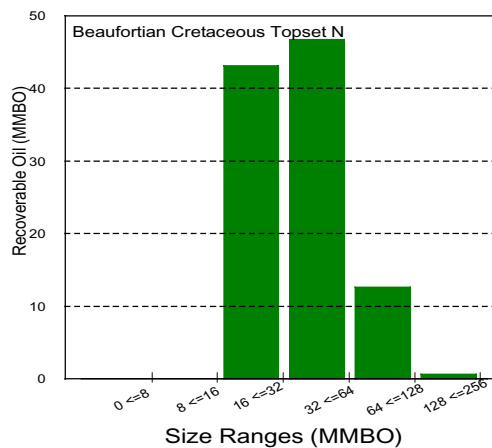
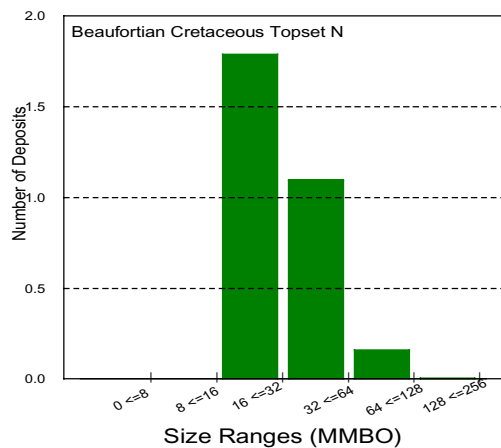


Table 13a: Input values for nonassociated gas accumulations in the Beaufortian Cretaceous Topset South Play
NPRA Assessment Form-2001

PLAY: **Beaufortian Cretaceous Topset South**
 Play area: **6,831** **10³** Acres

NONASSOCIATED GAS ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		LTP	50	5	Max	
NET RESERVOIR THICKNESS ¹	2	25	50	100	300	2
AREA OF CLOSURE ²	2	5	8	12	25	3
POROSITY ^{3,4}	2	8	12	16	20	2
TRAP FILL ³	6	50	75	99	100	2
HYDROCARBON PORE VOL ^{3,4}	3	3	7	11	15	
Approx in place bcf		0.08	0.91	5.69	49.01	
Recov bcf at surface		15.4	172.6	1074.3	9248.8	
1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0 5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point						
TRAP DEPTH (in 1000 ft) (from sea level)	2	10	12	14	20	
		Surface to sea level correction (1000 ft):				0.333

NONASSOCIATED GAS ACCUMULATION CHARACTERISTICS

NA Gas recovery factor %
 Type of reservoir-drive (check any that apply):
 Water: Gas expansion:
 Natural gas liquids plus condensate to non-associated gas (bbls/million cf) (in place):
 NGL-NAG=1.785*TD (at median)
 Non-associated gas quality parameters:
 Hydrogen sulfide %
 CO2 contamination %
 Other inert gases:
 Name: Percent:
 Name: Percent:
 Gas fvf Gas fvf= $752.2 \cdot (1 - \exp(-0.05728 \cdot TD))$ TD<=5.67 thous ft
 (at median depth) $113.3 + 21.1 \cdot TD - 0.812 \cdot TD^2 + 0.0116 \cdot TD^3$ 5.67<TD<=30
 TD=trap depth (thous ft)

TIME OF TRAP DEVELOPMENT

	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)	<input type="text"/>	<input type="text"/>	<input type="text"/>
STRUCTURAL COMPONENT (Ma)	<input type="text"/>	<input type="text"/>	<input type="text"/>

Assessor's Name:
 Date of Data Entry MM/DD/YYYY:
 Date of Simulation Run MM/DD/YYYY:

Table 13b: Input risking values for the Beaufortian Cretaceous Topset South Play
NPRA Assessment Form-2001

Play: **Beaufortian Cretaceous Topset South**

RISKING

MINIMUM ACCUMULATION SIZE, MAS (Millions of BBL in place)

50

PRERISKED FREQUENCY DISTRIBUTION (Oil plus Gas)

NUM OF PROSPECTS > MINIMUM SIZE	Est Shape	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
	Min	50	5	Max		
	2	15	30	45	90	3

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

ATTRIBUTES

PLAY CHARGE (C)
 ATTRIBUTES TRAP (T)
 TIMING (F)

Probability that play contains at least 1 reservoir >= minimum size (CxTxF)

PROBABILITY OF FAVORABLE

Computed

1
1
1

1

PROSPECT CHARGE (c)
 ATTRIBUTES TRAP (t)
 TIMING (f)

Probability that a randomly chosen prospect is favorable (cxtxf)

0.9
0.2
1

0.18

Play Attributes x Prospect Attributes (CxTxFxcxtxf)

0.18

FRACTION OF ACCUMULATIONS BEING OIL

Fraction NA Gas=1-Fraction(Oil)

0

1

Allocation (percent):

	Land	Oil	Gas
Federal	97	0	94
State	2	0	3
Native	1	0	3

Assessor's Name:

Dave Houseknecht

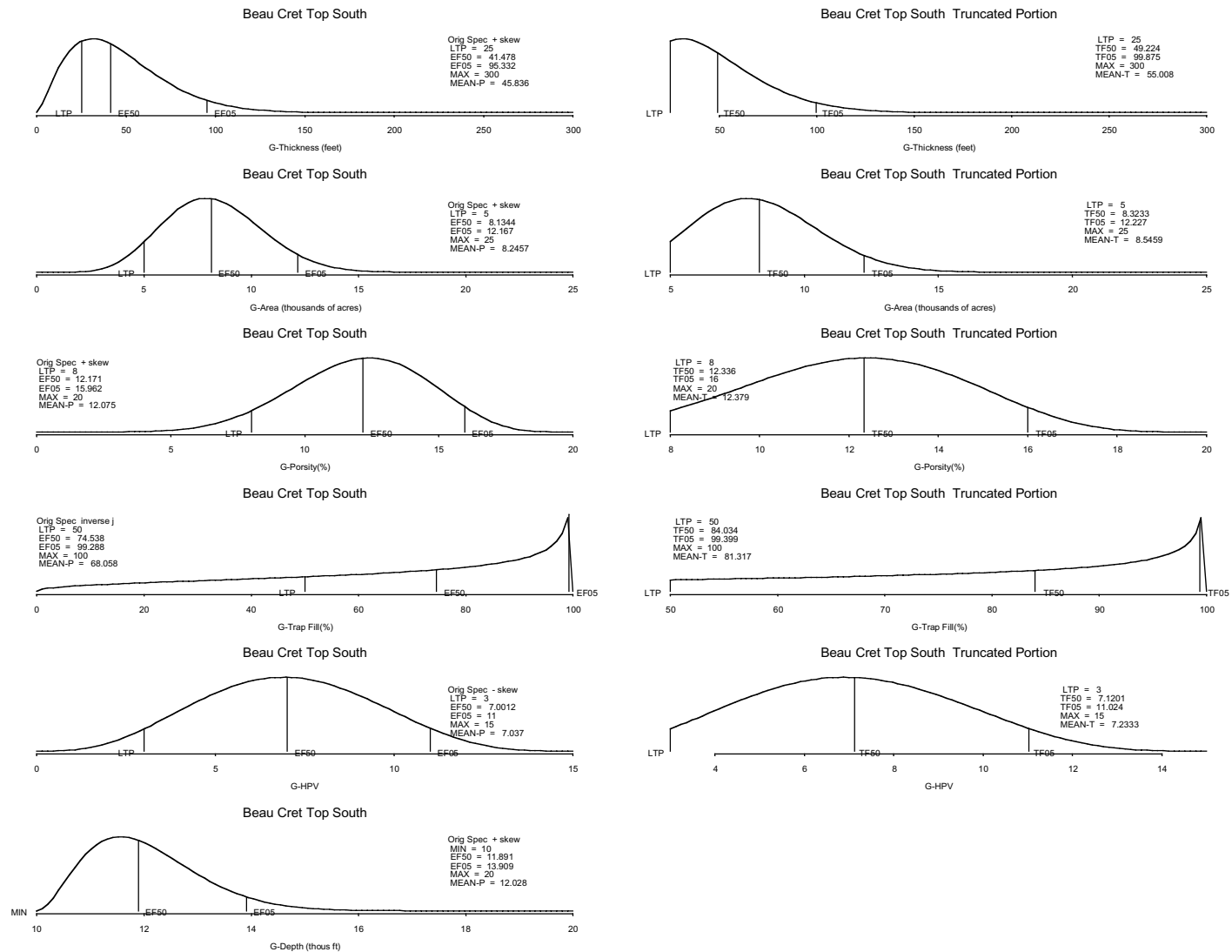
Date of Data Entry MM/DD/YYYY:

10/19/01

Date of Simulation Run MM/DD/YYYY:

1/19/02

Table 13c: Distribution of fitted hydrocarbon volume attributes, trap depth, and number of prospects for the Beaufortian Cretaceous Topset South Play



Beau Cret Top South

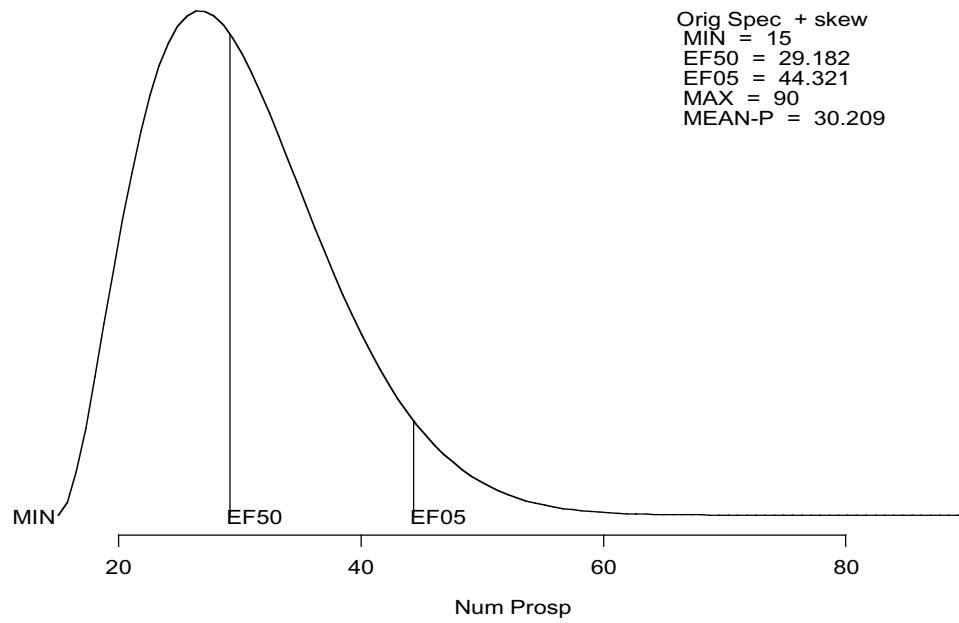
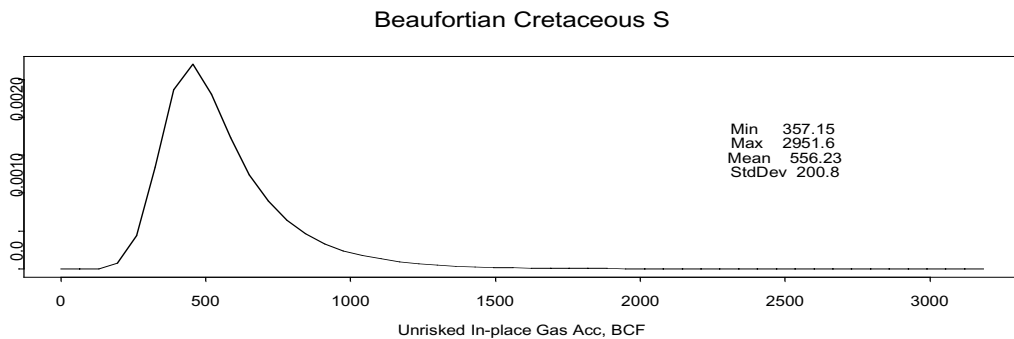


Table 13d: Estimated undiscovered oil and gas resources for the Beaufortian Cretaceous Topset South Play
Deposit



Play

Play Stats

Resource	Mean	StdDev	F95	F50	F05
In-place oil					
In-place NA gas	3042.44	1469.32	906.77	2889.00	5720.36
Recov oil					
Recov assoc diss gas					
Recov NA gas	2129.71	1028.53	634.74	2022.30	4004.25
Recov NGL (ADG)					
Recov NGL (NAG)	47.18	22.87	14.01	44.87	88.99
Num oil deposits					
Num NA gas deposits	5.47	2.52	2.00	5.00	10.00

RNS = 981

Play Totals Beaufortian Cretaceous Topset S

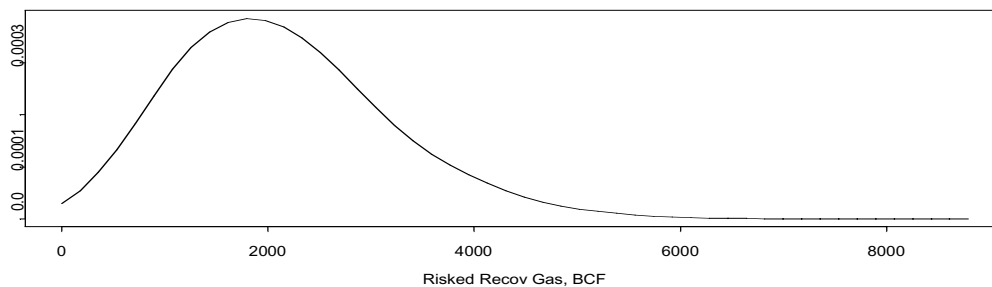


Table 13e: Estimated undiscovered oil and gas resources for the Beaufortian Cretaceous Topset South Play showing number of deposits and volumes by accumulation size class

Start size class	Oil deposits	Oil (MMBO)	Start size class	Gas deposits	Gas (BCFG)
0		0.00	0		0.00
8		0.00	48		0.00
16		0.00	96		0.00
32		0.00	192	3.39	1038.84
64		0.00	384	1.94	964.18
128		0.00	768	0.14	124.92
256		0.00	1536	0.00	1.98
512		0.00	3072		
Totals	0.00	0.00		5.47	2129.92

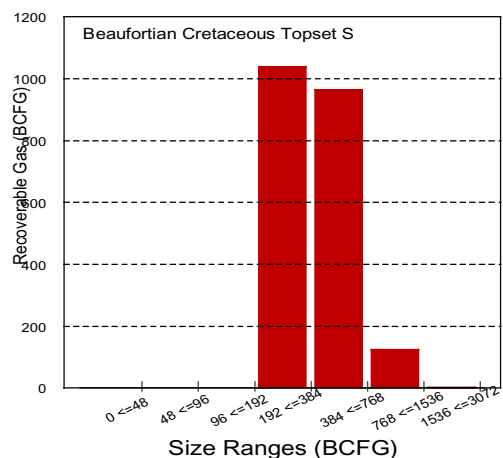
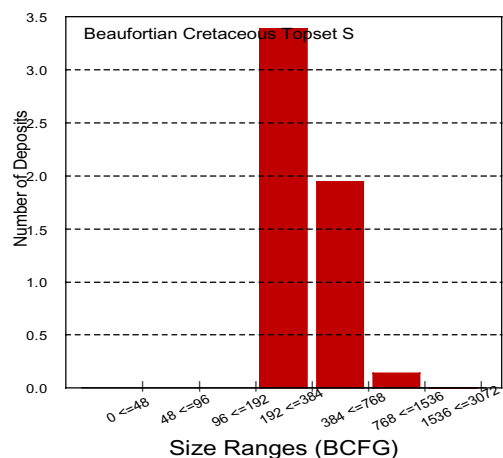


Table 14a: Input values for oil accumulations in the Beaufortian Upper Jurassic Topset NE Play
NPRA Assessment Form-2001

PLAY: **Beaufortian Upper Jurassic Topset NE**
 Play area: 4281 10³ Acres

SubArea A (northeast) NE

OIL ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN					Knowledge Level 1-3 ⁵	
		LTP	0.50	0.05	Max			
NET RESERVOIR THICKNESS ¹	2	25	50	75	150		2	Alpine Ave = 50
AREA OF CLOSURE ²	2	2	8	25	40		3	Alpine ~28,000 acres
POROSITY ^{3,4}	4	12	17	21	22		2	Left skewed
TRAP FILL ³	7	80	100	100	100		2	Enter POR*Sw
HYDROCARBON PORE VOL ^{3,4}	4	8	13	17	18			4
Approx mm bbl (fvf=1)		24.8	403.4	2472.9	8378.6			
Recov mm bbl at surface		7.4	119.5	732.3	2481.1			
1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0								
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point								
TRAP DEPTH (in 1000 ft)	3	3	9	10	11		1	See SubAreas Tab
(from sea level)		Surface to sea level correction (1000 ft):				0.102		

OIL ACCUMULATION CHARACTERISTICS

Oil recovery factor % **50**

Type of reservoir-drive (check any that apply):
 Water: ☐ Depletion: ☒ Gas expansion: ☐

FVF (Formation volume factor, rb/stb): **1.69** (at median depth) FVF=0.972+0.000147*F^{1.175}

Pressure(psi)	4500	P=TD*0.5*1000	TD=trap depth (thous ft), P=pressure (psi)
temp(deg F)	201	T=19*TD+30	T=temp deg F LN is log base e
SolGasGr	0.757	SGG=((0.1402*LN(C27+14.7)-0.4227)+(0.1369*LN(C28)+0.0156)+(0.1704*LN(E37)+AG=API gravity	
F	1376	Uncorrected GOR=SGG*((P+14.7)*10^(0.0125*AG))/(18*10^(0.00091*T)))^(1/0.83)	
		F= Final GOR*(SGG/OG)^0.5+1.25*T	OG=141.5/(131.5+AG)

GOR (Associated gas to oil ratio, cu.ft./bbl, at stp): **1178** Final GOR at median depth
1370 Uncorrected GOR

NGLR (Natural gas liquids to associated gas ratio, bbls/million cu.ft., at stp)= 4.5985*exp(.1711*TD) **21.4** (median depth)

Oil quality parameters:
 API gravity **39** Oil Grav (ratio) **0.830**
 Sulfur content of oil **0.3**

Associated gas quality parameters:
 Hydrogen sulfide % **0**
 CO2 contamination % **0**
 Other inert gases:
 Name: Percent:
 Name: Percent:

TIME OF TRAP DEVELOPMENT	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)	159	154	151
STRUCTURAL COMPONENT (Ma)			

Assessor's Name: **Dave Houseknecht**
 Date of Data Entry MM/DD/YYYY: **10/19/01**
 Date of Simulation Run MM/DD/YYYY: **2/20/02**

Note: only enter play name and assessor's name on Oil worksheet

Table 14b: Input risking values for the Beaufortian Upper Jurassic Topset NE Play
NPRA Assessment Form-2001

Play: **Beaufortian Upper Jurassic Topset NE**

RISKING

MINIMUM ACCUMULATION SIZE, MAS (Millions of BBL in place)

50

PRERISKED FREQUENCY DISTRIBUTION (Oil plus Gas)

NUM OF PROSPECTS > MINIMUM SIZE	Est Shape	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		Min	50	5	Max	
	2	30	60	90	120	3

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

ATTRIBUTES

PLAY CHARGE (C)
 ATTRIBUTES TRAP (T)
 TIMING (F)

Probability that play contains at least 1 reservoir >= minimum size (CxTxF)

PROBABILITY OF FAVORABLE

Computed

1
1
1

1

PROSPECT CHARGE (c)
 ATTRIBUTES TRAP (t)
 TIMING (f)

Probability that a randomly chosen prospect is favorable (cxtxf)

0.7
0.7
1

0.49

Play Attributes x Prospect Attributes (CxTxFxcxtxf)

0.49

FRACTION OF ACCUMULATIONS BEING OIL

Fraction NA Gas=1-Fraction(Oil)

1

0

Allocation (percent):

	Land	Oil	Gas
Federal	93	92	
State	3	1	
Native	4	7	

Assessor's Name:

Dave Houseknecht

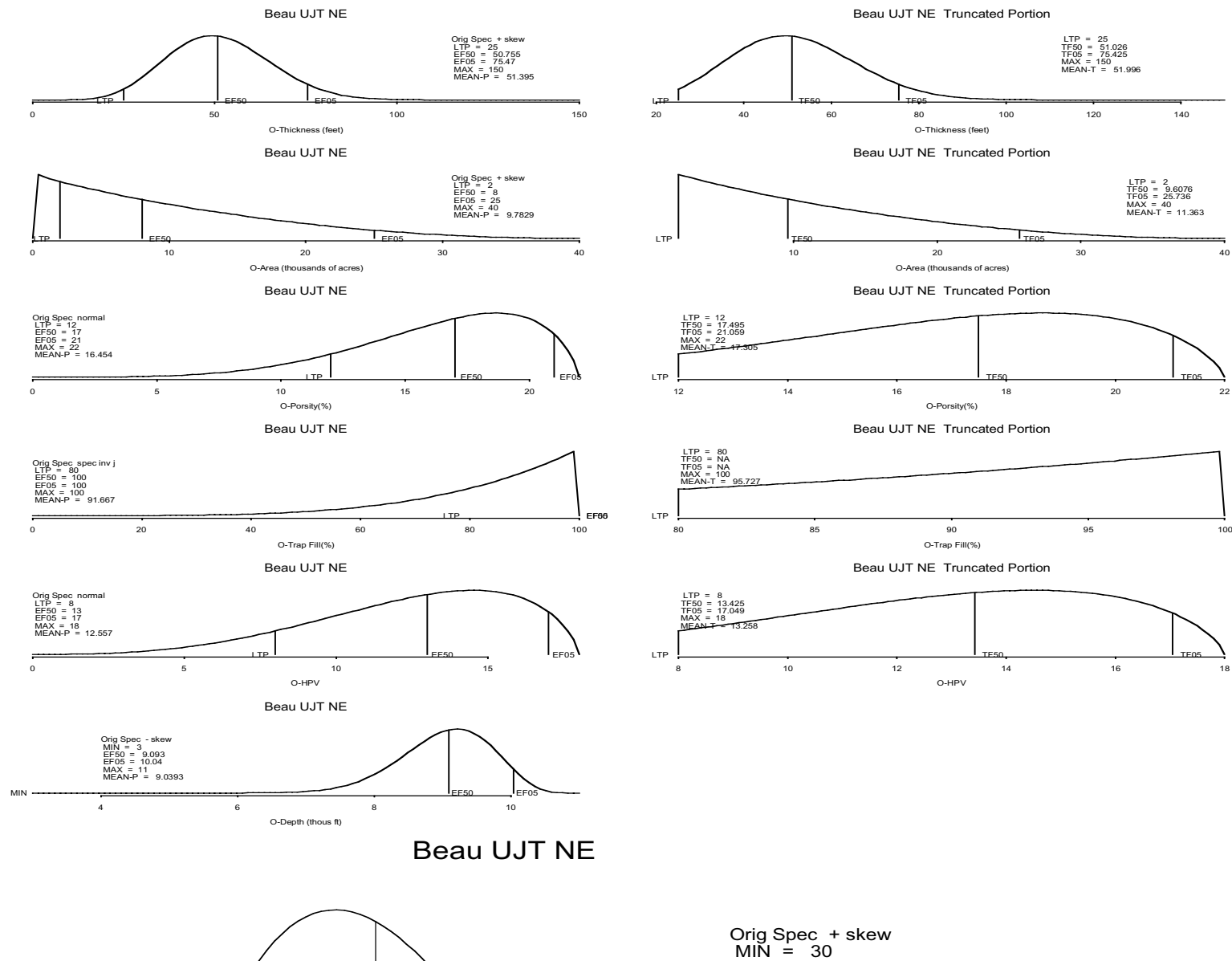
Date of Data Entry MM/DD/YYYY:

10/19/01

Date of Simulation Run MM/DD/YYYY:

2/20/02

Table 14c: Distribution of fitted hydrocarbon volume attributes, trap depth, and number of prospects for the Beaufortian Upper Jurassic Topset NE Play



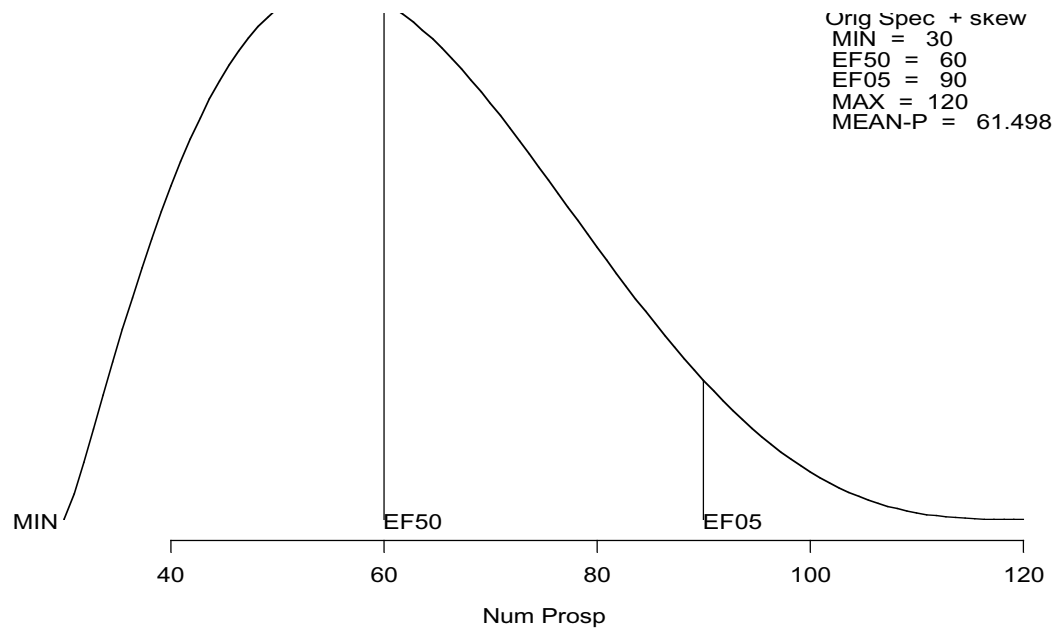


Table 14d: Estimated undiscovered oil and gas resources for the Beaufortian Upper Jurassic Topset NE Play

Start size class	Oil deposits	Oil (MMBO_	Start size cl	Gas deposits	NA Gas (BCFG)
0	0.00	0.00	0		
8	0.00	0.00	48		
16	0.79	22.55	96		
32	5.03	242.39	192		
64	8.35	785.80	384		
128	9.78	1793.59	768		
256	5.57	1916.99	1536		
512	0.67	411.67	3072		
1024	0.00	3.05	6144		
Totals	30.19	5176.05			

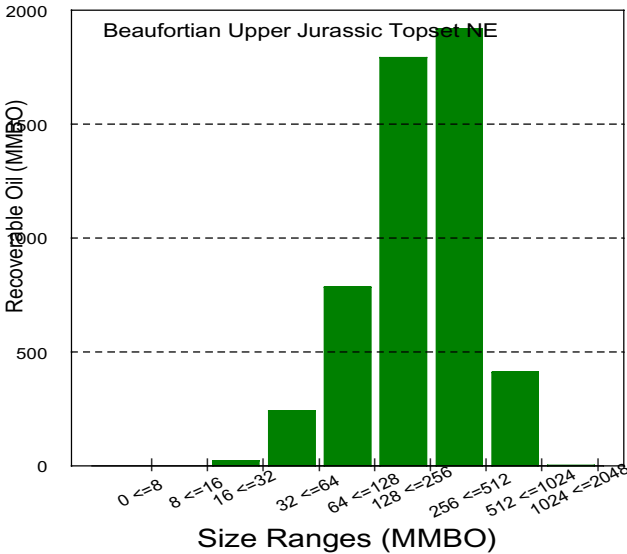
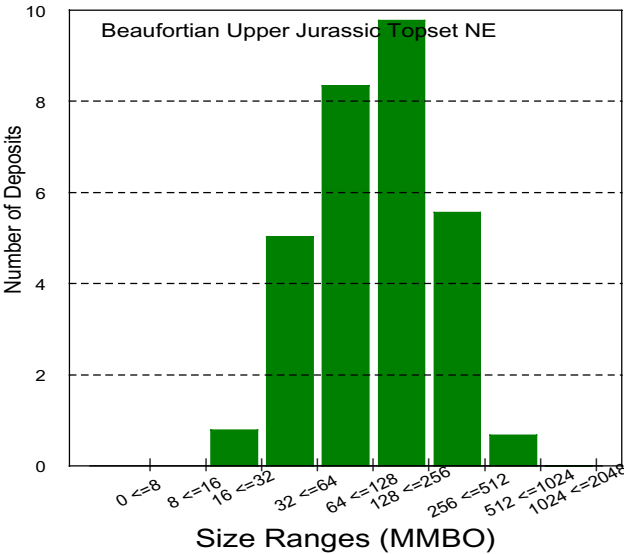


Table 15a: Input values for oil accumulations in the Beaufortian Upper Jurassic Topset SE Play
NPRA Assessment Form-2001

PLAY: **Beaufortian Upper Jurassic Topset SE**
 Play area: 1795 10³ Acres

SubArea B (eastcentral) SE

OIL ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵	
		LTP	0.50	0.05	Max		
NET RESERVOIR THICKNESS ¹	2	20	40	75	150	2	More distal
AREA OF CLOSURE ²	2	4	10	25	40	3	Alpine ~28,000 acres
POROSITY ^{3,4}	4	10	15	19	20	2	Deeper Left Skewed
TRAP FILL ³	7	80	100	100	100	2	Enter POR*Sw
HYDROCARBON PORE VOL ^{3,4}	4	6	11	15	16		4
Approx mm bbl (fvf=1)		29.8	341.4	2181.9	7447.7		
Recov mm bbl at surface		8.0	92.0	588.1	2007.4		
1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0							
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point							
TRAP DEPTH (in 1000 ft)	2	10	11	12	14		
(from sea level)		Surface to sea level correction (1000 ft):				0.246	

1 See SubAreas Tab
 modified Nov 10 - DWH
 definitely a right-skewed distribution

OIL ACCUMULATION CHARACTERISTICS

Oil recovery factor % 50

Type of reservoir-drive (check any that apply):

Water: Depletion: x Gas expansion: x

FVF (Formation volume factor, rb/stb):

Pressure(psi)	5500
temp(deg F)	239
SolGasGr	0.774
F	1644

1.86 (at median depth)

FVF=0.972+0.000147*F^{1.175}

P=TD*0.5*1000

TD=trap depth (thous ft), P=pressure (psi)

T=19*TD+30

T=temp deg F LN is log base e

SGG=((0.1402*LN(C27+14.7)-0.4227)+(0.1369*LN(C28)+0.0156)+(0.1704*LN(E3 AG=API gravity

Uncorrected GOR=SGG*((P+14.7)*10^(0.0125*AG))/(18*10^(0.00091*T)))^(1/0.83)

F= Final GOR*(SGG/OG)^0.5+1.25*T

OG=141.5/(131.5+AG)

GOR (Associated gas to oil ratio, cu.ft./bbl, at stp):

1393

Final GOR at median depth

1620

Uncorrected GOR

NGLR (Natural gas liquids to associated gas ratio, bbls/million cu.ft., at stp)= 4.5985*exp(.1711*TD)

30.2 (median depth)

Oil quality parameters:

API gravity

39

Oil Grav (ratio)

0.830

Sulfur content of oil

0.3

Associated gas quality parameters:

Hydrogen sulfide %

0

CO2 contamination %

0

Other inert gases:

Name:

Percent:

Name:

Percent:

TIME OF TRAP DEVELOPMENT

STRATIGRAPHIC COMPONENT (Ma)

BEGIN

PEAK

END

159

154

151

STRUCTURAL COMPONENT (Ma)

Assessor's Name:

Dave Houseknecht

Date of Data Entry MM/DD/YYYY:

10/19/01

Date of Simulation Run MM/DD/YYYY:

Note: only enter play name and assessor's name on Oil worksheet

Table 15b: Input values for nonassociated gas accumulations in the Beaufortian Upper Jurassic Topset SE Play
NPRA Assessment Form-2001

PLAY: **Beaufortian Upper Jurassic Topset SE**

SubArea B (eastcentral) SE

NONASSOCIATED GAS ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		LTP	50	5	Max	
NET RESERVOIR THICKNESS ¹	2	20	40	75	150	2
AREA OF CLOSURE ²	2	4	10	25	40	3
POROSITY ^{3,4}	4	10	15	19	20	2
TRAP FILL ³	7	80	100	100	100	2
HYDROCARBON PORE VOL ^{3,4}	4	6	11	15	16	2
Approx in place bcf		0.17	1.92	12.25	41.82	
Recov bcf at surface		30.0	343.7	2196.7	7498.2	
1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0						
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point						
TRAP DEPTH (in 1000 ft)	2	10	13	16	20	1
(from sea level)	Surface to sea level correction (1000 ft):				0.246	

Uses oil POR*Sw

4

NONASSOCIATED GAS ACCUMULATION CHARACTERISTICS

NA Gas recovery factor %

Type of reservoir-drive (check any that apply):

Water:

Gas expansion:

Natural gas liquids plus condensate to non-associated gas (bbls/million cf) (in place):

NGL-NAG=1.785*TD (at median)

Non-associated gas quality parameters:

Hydrogen sulfide %

CO2 contamination %

Other inert gases:

Name:

Percent:

Name:

Percent:

Gas fvf Gas fvf= $752.2 \cdot (1 - \exp(-0.05728 \cdot TD))$ TD<=5.67 thous ft
(at median depth) $113.3 + 21.1 \cdot TD - 0.812 \cdot TD^2 + 0.0116 \cdot TD^3$ 5.67<TD<=30
TD=trap depth (thous ft)

TIME OF TRAP DEVELOPMENT ¹	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)			
STRUCTURAL COMPONENT (Ma)			

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Table 15c: Input risking values for the Beaufortian Upper Jurassic Topset SE Play
NPRA Assessment Form-2001

Play: **Beaufortian Upper Jurassic Topset SE**

RISKING

MINIMUM ACCUMULATION SIZE, MAS (Millions of BBL in place)

50

PRERISKED FREQUENCY DISTRIBUTION (Oil plus Gas)

NUM OF PROSPECTS > MINIMUM SIZE	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
	Est Shape	Min	50	5	Max
	2	10	18	28	40
					3

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

ATTRIBUTES

PLAY
ATTRIBUTES

CHARGE (C)
TRAP (T)
TIMING (F)

Probability that play contains at least 1 reservoir >= minimum size (CxTxF)

PROBABILITY OF FAVORABLE

Computed

1
1
1

1

PROSPECT
ATTRIBUTES

CHARGE (c)
TRAP (t)
TIMING (f)

Probability that a randomly chosen prospect is favorable (cxtxf)

0.9
0.5
1

0.45

Play Attributes x Prospect Attributes (CxTxFxcxtxf)

0.45

FRACTION OF ACCUMULATIONS BEING OIL

Fraction NA Gas=1-Fraction(Oil)

0

1

Allocation (percent):

	Land	Oil	Gas
Federal	100		100
State	0		0
Native	0		0

Assessor's Name:

Dave Houseknecht

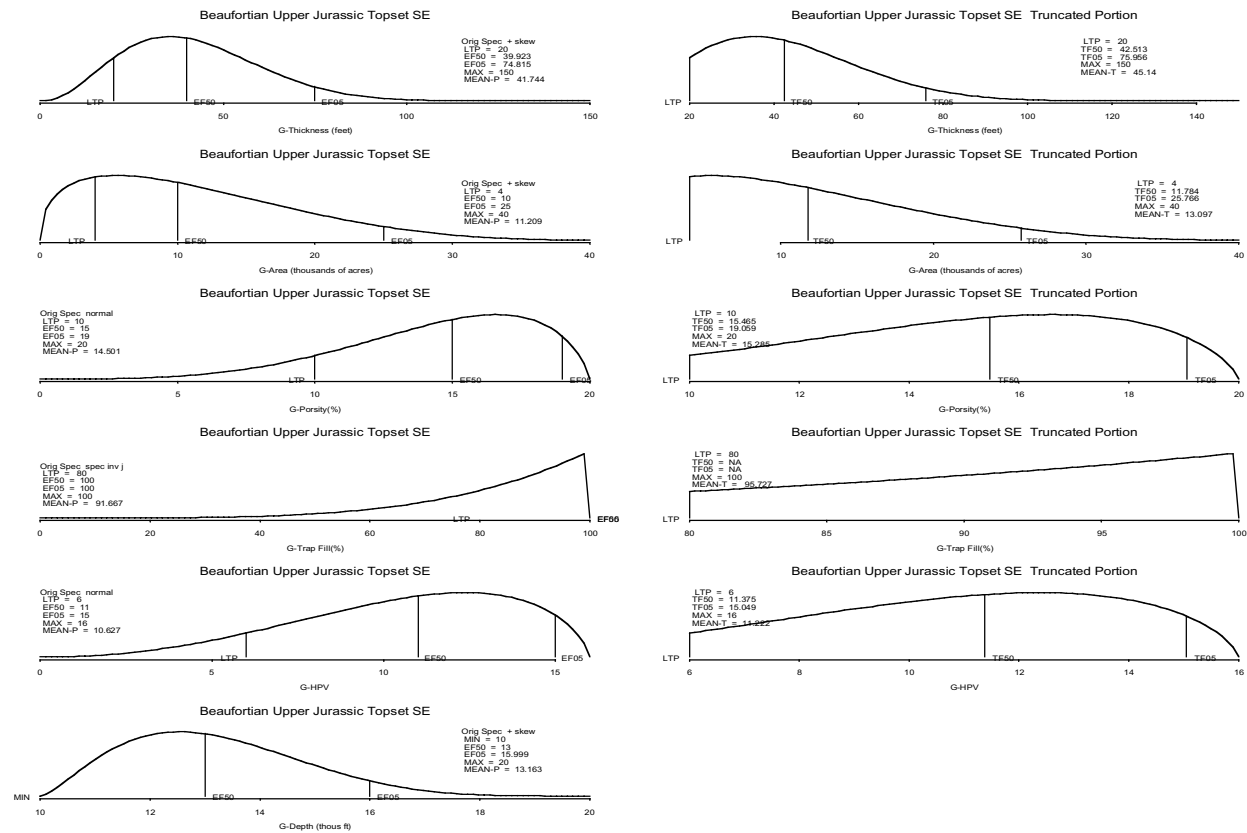
Date of Data Entry MM/DD/YYYY:

10/19/01

Date of Simulation Run MM/DD/YYYY:

2/20/02

Table 15d: Distribution of fitted hydrocarbon volume attributes, trap depth, and number of prospects for the Beaufortian Upper Jurassic Topset SE Play



Beaufortian Upper Jurassic Topset SE

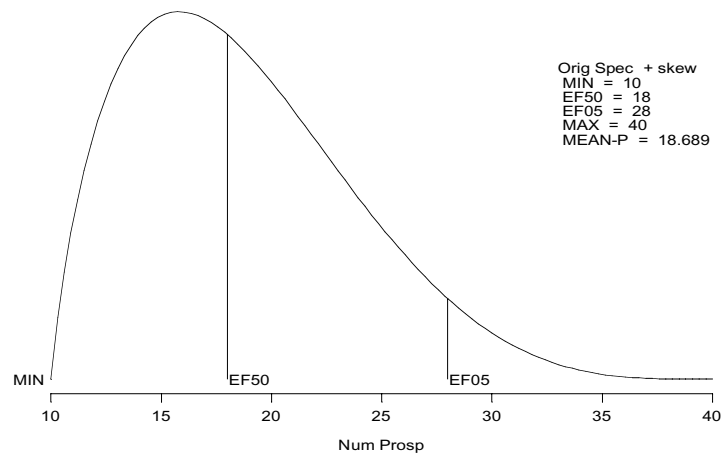
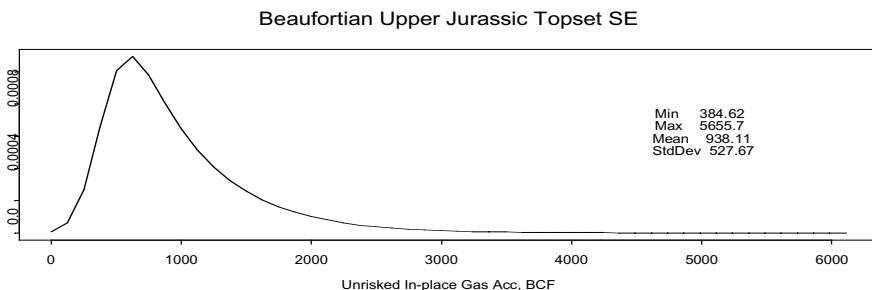


Table 15e: Estimated undiscovered oil and gas resources for the Beaufortian Upper Jurassic Topset SE Play
Deposit



Play Stats

Resource	Unit	Mean	StdDev	F95	F50	F05
In-place oil	MMBO	0.00	0.00	0.00	0.00	0.00
In-place NA gas	BCFG	7903.28	3305.13	3159.04	7520.49	13892.57
Recov oil	MMBO	0.00	0.00	0.00	0.00	0.00
Recov assoc diss gas	BCFG	0.00	0.00	0.00	0.00	0.00
Recov NA gas	BCFG	5137.13	2148.33	2053.38	4888.32	9030.17
Recov NGL (ADG)	MMBO	0.00	0.00	0.00	0.00	0.00
Recov NGL (NAG)	MMBO	123.53	52.21	48.69	117.36	218.62
Num oil deposits		0.00	0.00	0.00	0.00	0.00
Num NA gas deposits		8.42	3.14	4.00	8.00	14.00

Random Number Seed (RNS) = 616

Play Totals Beaufortian Upper Jurassic Topset SE

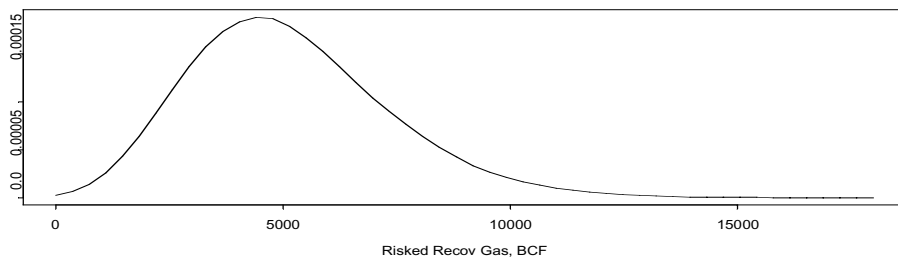


Table 15f: Estimated undiscovered oil and gas resources for the Beaufortian Upper Jurassic Topset SE Play showing number of deposits and volumes by accumulation size class

Start size class	Oil deposits	Oil (MMBO_	Start size class	Gas deposits	NA Gas (BCFG)
0			0	0.00	0.00
8			48	0.00	0.00
16			96	0.00	0.00
32			192	2.48	780.68
64			384	3.95	2147.71
128			768	1.80	1832.83
256			1536	0.20	371.78
512			3072	0.00	4.65
Totals	0.00	0.00		8.43	5137.65

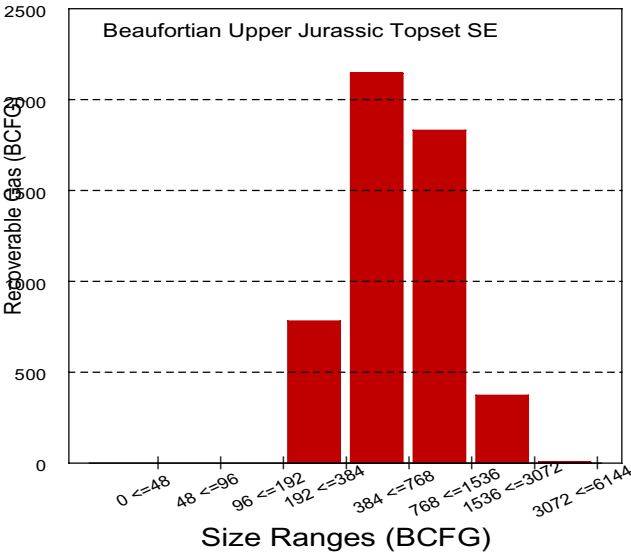
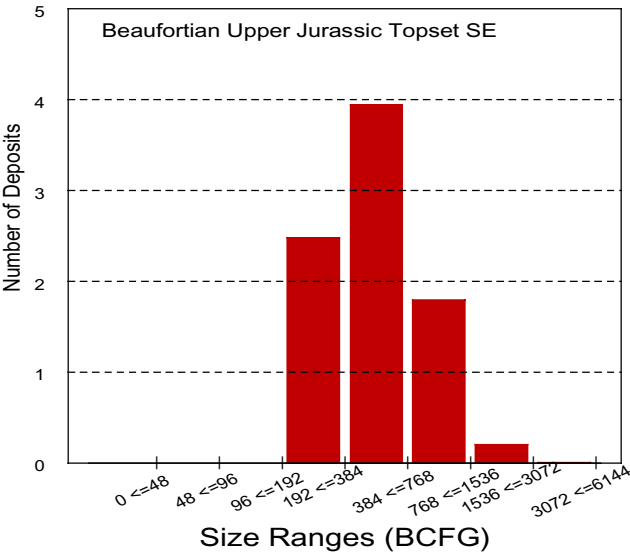


Table 16a: Input values for oil accumulations in the Beaufortian Upper Jurassic Topset NW Play
NPRA Assessment Form-2001

PLAY: **Beaufortian Upper Jurassic Topset NW**
 Play area: 2290.77 10³ Acres

SubArea D (northwest) NW

OIL ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵	
		LTP	0.50	0.05	Max		
NET RESERVOIR THICKNESS ¹	2	25	50	75	150	2	Alpine Ave = 50
AREA OF CLOSURE ²	2	2	8	25	40	3	Alpine ~28,000 acres
POROSITY ^{3,4}	4	12	17	21	22	2	Left skewed
TRAP FILL ³	7	80	100	100	100	2	Enter POR*Sw
HYDROCARBON PORE VOL ^{3,4}	4	8	13	17	18		4
Approx mm bbl (fvf=1)		24.8	403.4	2472.9	8378.6		
Recov mm bbl at surface		7.4	119.5	732.3	2481.1		
1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0							
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point							
TRAP DEPTH (in 1000 ft) (from sea level)	3	3	9	10	11	1	See SubAreas Tab
Surface to sea level correction (1000 ft):					0.049		

20	40	75	150
5	15	30	40
12	17	21	22
80	100	100	100

OIL ACCUMULATION CHARACTERISTICS

Oil recovery factor % 50

Type of reservoir-drive (check any that apply):

Water:

Depletion: x

Gas expansion:

FVF (Formation volume factor, rb/stb):

1.69 (at median depth)

FVF=0.972+0.000147*F^{1.175}

Pressure(psi) 4500

P=TD*0.5*1000

TD=trap depth (thous ft), P=pressure (psi)

Temp(deg F) 201

T=19*TD+30

T=temp deg F LN is log base e

SolGasGr 0.757

SGG=((0.1402*LN(C27+14.7)-0.4227)+(0.1369*LN(C28)+0.0156)+(0.1704*LN(E_s AG=API gravity

F 1376

Uncorrected GOR=SGG*((P+14.7)*10⁴(0.0125*AG)/(18*10⁴(0.00091*T)))^(1/0.83)

F= Final GOR*(SGG/OG)^{0.5+1.25*T}

OG=141.5/(131.5+AG)

GOR (Associated gas to oil ratio, cu.ft./bbl, at stp):

1178

Final GOR at median depth

1370

Uncorrected GOR

NGLR (Natural gas liquids to associated gas ratio, bbls/million cu.ft., at stp)= 4.5985*exp(-.1711*TD)

21.4

(median depth)

Oil quality parameters:

API gravity

39

Oil Grav (ratio)

0.830

Sulfur content of oil

0.3

Associated gas quality parameters:

Hydrogen sulfide %

0

CO2 contamination %

0

Other inert gases:

Name:

Percent:

Name:

Percent:

TIME OF TRAP DEVELOPMENT

STRATIGRAPHIC COMPONENT (Ma)

BEGIN

PEAK

END

159

154

151

STRUCTURAL COMPONENT (Ma)

Assessor's Name:

Dave Houseknecht

Date of Data Entry MM/DD/YYYY:

10/19/01

Date of Simulation Run MM/DD/YYYY:

Note: only enter play name and assessor's name on Oil worksheet

Table 16b: Input risking values for the Beaufortian Upper Jurassic Topset NW Play

NPRA Assessment Form-2001

Play: **Beaufortian Upper Jurassic Topset NW**

RISKING

MINIMUM ACCUMULATION SIZE, MAS (Millions of BBL in place)

50

PRERISKED FREQUENCY DISTRIBUTION (Oil plus Gas)

NUM OF PROSPECTS > MINIMUM SIZE	PROB OF AND GREATER THAN					Knowledge Level 1-3 ⁵
	Est Shape	Min	5 0	5	Max	
	2	1 5	3 0	4 5	6 0	3

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

--	--	--	--

ATTRIBUTES

**PROBABILITY
OF FAVORABLE**

Computed

PLAY CHARGE (C)
ATTRIBUTES TRAP (T)
TIMING (F)

1
1
1

Probability that play contains at least 1 reservoir >= minimum size (CxTxF)

1

PROSPECT CHARGE (c)
ATTRIBUTES TRAP (t)
TIMING (f)

0.5
0.7
1

Probability that a randomly chosen prospect is favorable (cxtxf)

0.35

Play Attributes x Prospect Attributes (CxTxFxcxtxf)

0.35

FRACTION OF ACCUMULATIONS BEING OIL

1

Fraction NA Gas=1-Fraction(Oil)

0

Allocation (percent):

	Land	Oil	Gas
Federal	71	75	
State	13	12	
Native	16	13	

Assessor's Name:

Dave Houseknecht

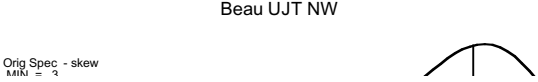
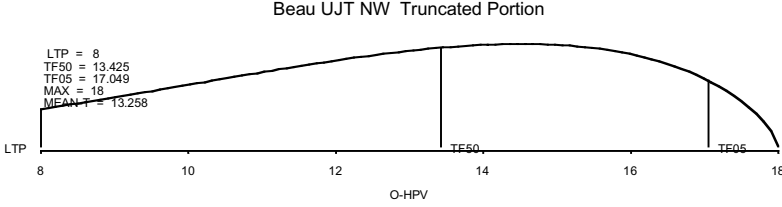
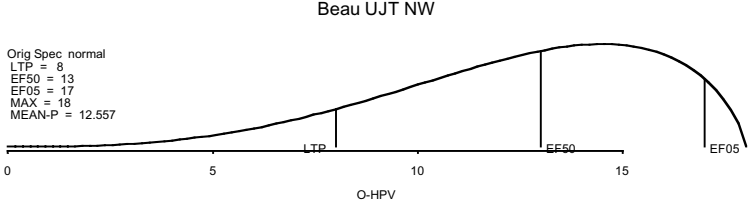
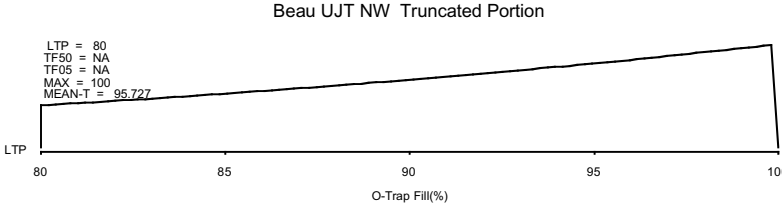
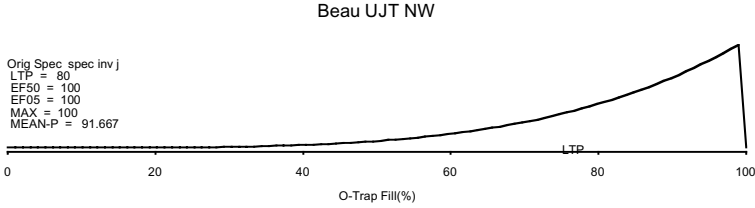
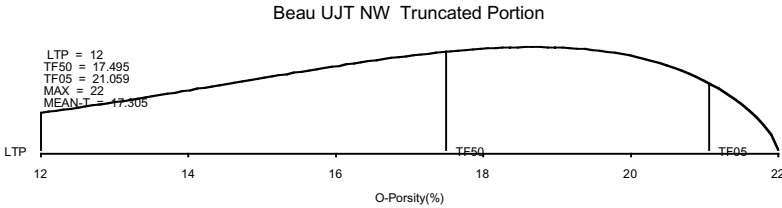
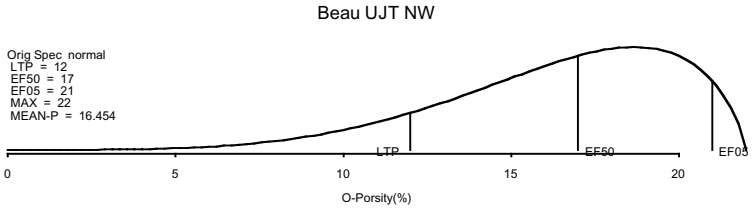
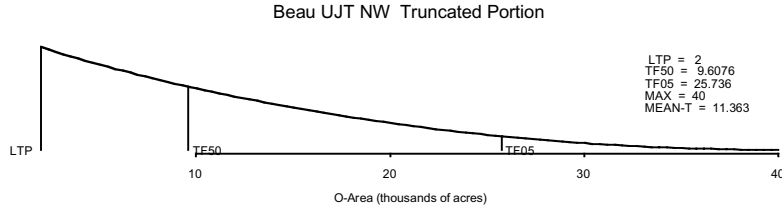
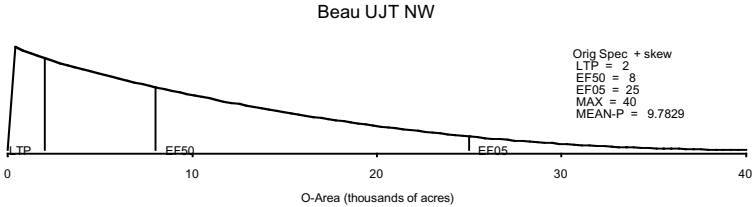
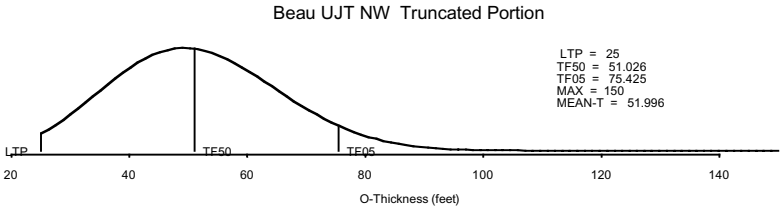
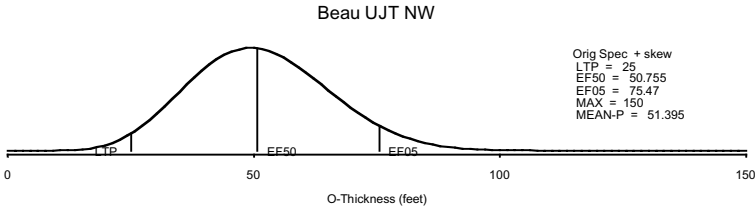
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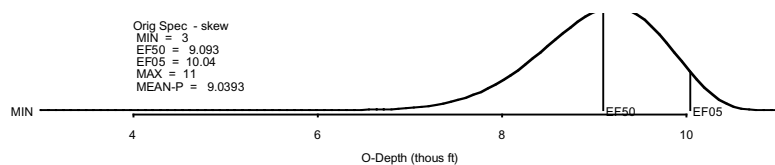
10/19/01

Date of Simulation Run MM/DD/YYYY:

2/20/02

Table 16c: Distribution of fitted hydrocarbon volume attributes, trap depth, and number of prospects for the Beaufortian Upper Jurassic Topset NW Play





Beau UJT NW

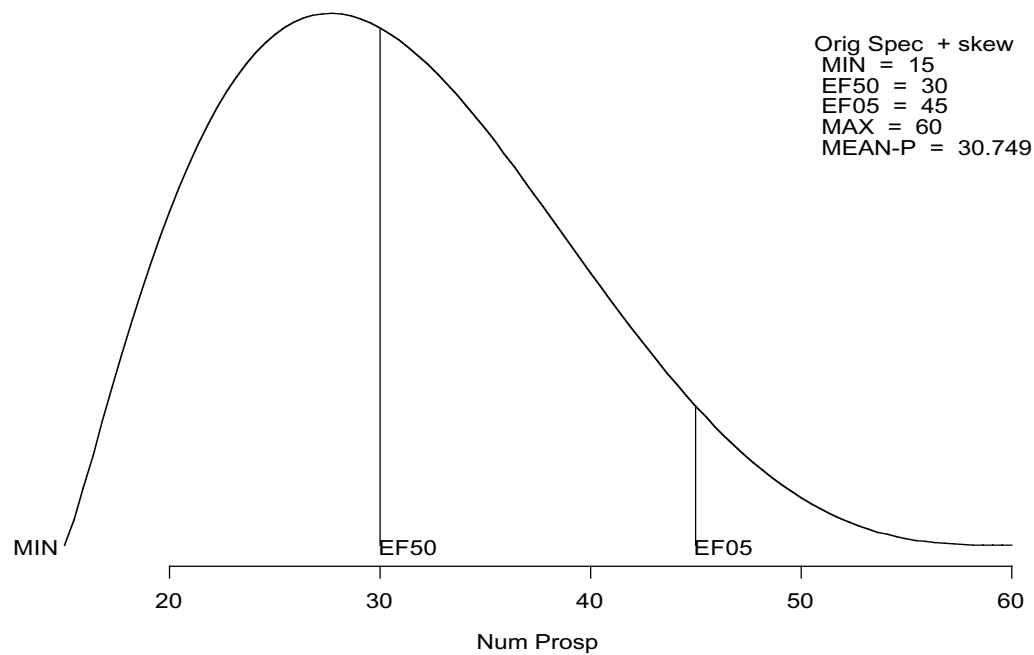
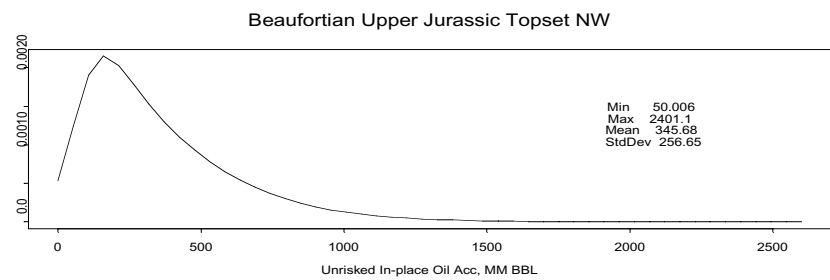


Table 16d: Estimated undiscovered oil and gas resources for the Beaufortian Upper Jurassic Topset NW Play

Deposit



Play Stats						
Resource	Unit	Mean	StdDev	F95	F50	F05
In-place oil	MMBO	3718.82	1573.33	1466.58	3540.26	6623.71
In-place NA gas	BCFG			0.00		
Recov oil	MMBO	1859.41	786.67	733.29	1770.13	3311.86
Recov assoc diss gas	BCFG	2253.03	953.60	879.72	2143.10	4003.36
Recov NA gas	BCFG			0.00		
Recov NGL (ADG)	MMBO	40.54	17.19	15.76	38.58	71.90
Recov NGL (NAG)	MMBO			0.00		
Num oil deposits		10.76	3.85	5.00	10.00	18.00
Num NA gas deposits				0.00		

RNS = 438

Play Totals Beaufortian Upper Jurassic Topset NW

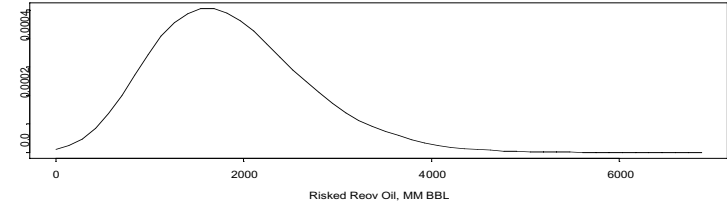


Table 16e: Estimated undiscovered oil and gas resources for the Beaufortian Upper Jurassic Topset NW Play showing number of deposits and volumes by accumulation size class

Start size class	Oil deposits	Oil (MMBO)	Start size class	Gas deposits	Gas (BCFG)
0	0.00	0.00	0		
8	0.00	0.00	48		
16	0.28	8.16	96		
32	1.76	84.58	192		
64	2.99	281.39	384		
128	3.46	635.80	768		
256	2.02	696.21	1536		
512	0.25	152.58	3072		
1024	0.00	0.86			
Totals	10.76	1859.60		0.00	0.00

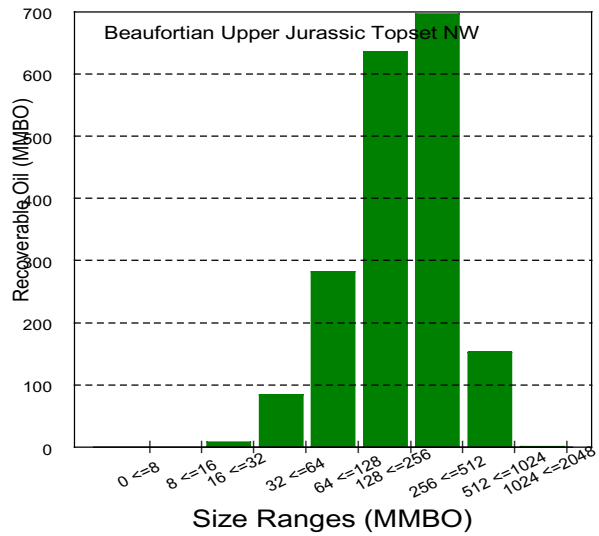
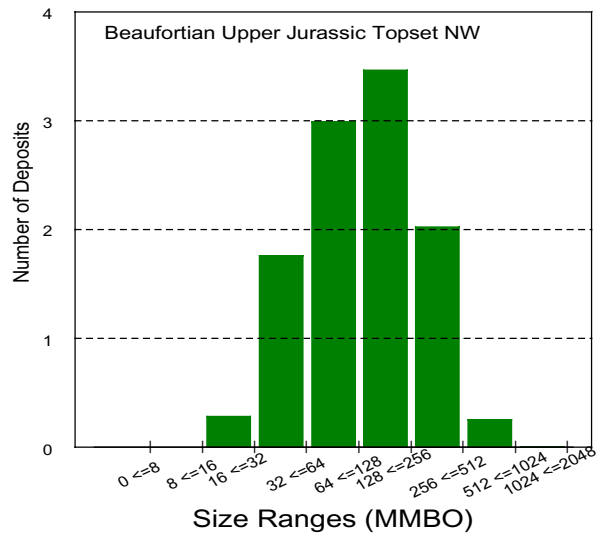


Table 17a: Input values for oil accumulations in the Beaufortian Upper Jurassic Topset SW Play

NPRA Assessment Form-2001

PLAY: **Beaufortian Upper Jurassic Topset SW**
 Play area: 3335 10³ Acres

SubArea E (westcentral) SW

OIL ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵	
		LTP	0.50	0.05	Max		
NET RESERVOIR THICKNESS ¹	2	20	40	75	150	2	Alpine Ave = 50
AREA OF CLOSURE ²	2	4	10	25	40	3	Alpine ~28,000 acres
POROSITY ^{3,4}	4	10	15	19	20	2	Left skewed
TRAP FILL ³	7	80	100	100	100	2	Enter POR*Sw
HYDROCARBON PORE VOL ^{3,4}	3	6	11	15	16		4
Approx mm bbl (fvf=1)		29.8	341.4	2181.9	7447.7		
Recov mm bbl at surface		8.0	92.0	588.1	2007.4		

1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

TRAP DEPTH (in 1000 ft)	2	10	11	12	14	1	See SubAreas Tab
(from sea level)	Surface to sea level correction (1000 ft): 0.25						

modified Nov 10 - DWH
 definitely a right-skewed distribution

OIL ACCUMULATION CHARACTERISTICS

Oil recovery factor % 50

Type of reservoir-drive (check any that apply):

Water: ☐

Depletion: ☒

Gas expansion: ☒

FVF (Formation volume factor, rb/stb): 1.86 (at median depth) FVF=0.972+0.000147*F^{1.175}

Pressure(psi)	5500
temp(deg F)	239
SolGasGr	0.774
F	1644

P=TD*0.5*1000

TD=trap depth (thous ft), P=pressure (psi)

T=19*TD+30

T=temp deg F

LN is log base e

SGG=((0.1402*LN(C27+14.7)-0.4227)+(0.1369*LN(C28)+0.0156)+(0.1704*LN(E AG=API gravity

Uncorrected GOR=SGG*((P+14.7)*10⁴*(0.0125*AG)/(18*10⁴*(0.00091*T)))^{1/0.83}

F= Final GOR*(SGG/OG)^{0.5+1.25*T}

OG=141.5/(131.5+AG)

GOR (Associated gas to oil ratio, cu.ft./bbl, at stp):

1393

Final GOR at median depth

1620

Uncorrected GOR

NGLR (Natural gas liquids to associated gas ratio, bbls/million cu.ft., at stp)= 4.5985*exp(.1711*TD)

30.2

(median depth)

Oil quality parameters:

API gravity

39

Oil Grav (ratio)

0.830

Sulfur content of oil

0.3

Associated gas quality parameters:

Hydrogen sulfide %

0

CO2 contamination %

0

Other inert gases:

Name:

Percent:

Name:

Percent:

TIME OF TRAP DEVELOPMENT

BEGIN PEAK END

STRATIGRAPHIC COMPONENT (Ma)

159

154

151

STRUCTURAL COMPONENT (Ma)

Assessor's Name:

Dave Houseknecht

Date of Data Entry MM/DD/YYYY:

10/19/01

Date of Simulation Run MM/DD/YYYY:

1/19/02

Note: only enter play name and assessor's name on Oil worksheet

Table 17b: Input values for nonassociated gas accumulations in the Beaufortian Upper Jurassic Topset SW Play

NPRA Assessment Form-2001

PLAY: **Beaufortian Upper Jurassic Topset SW**

SubArea E (westcentral) SW

NONASSOCIATED GAS ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		LTP	50	5	Max	
NET RESERVOIR THICKNESS ¹	2	20	40	75	150	2
AREA OF CLOSURE ²	2	4	10	25	40	3
POROSITY ^{3,4}	4	10	15	19	20	2
TRAP FILL ³	7	80	100	100	100	2
HYDROCARBON PORE VOL ^{3,4}	3	6	11	15	16	4
Approx in place bcf		0.17	1.92	12.25	41.82	
Recov bcf at surface		30.0	343.7	2196.7	7498.2	
1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0						
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point						
TRAP DEPTH (in 1000 ft)	2	10	13	16	20	1
(from sea level)	Surface to sea level correction (1000 ft):					0.25

Uses oil POR*Sw

NONASSOCIATED GAS ACCUMULATION CHARACTERISTICS

NA Gas recovery factor %

Type of reservoir-drive (check any that apply):

Water:

Gas expansion:

Natural gas liquids plus condensate to non-associated gas (bbls/million cf) (in place):

NGL-NAG=1.785*TD (at median)

Non-associated gas quality parameters:

Hydrogen sulfide %

CO2 contamination %

Other inert gases:

Name:

Percent:

Name:

Percent:

Gas fvf Gas fvf= $752.2 \cdot (1 - \text{EXP}(-0.05728 \cdot \text{TD}))$ TD<=5.67 thous ft
(at median depth) $113.3 + 21.1 \cdot \text{TD} - 0.812 \cdot \text{TD}^2 + 0.0116 \cdot \text{TD}^3$ 5.67<TD<=30
TD=trap depth (thous ft)

TIME OF TRAP DEVELOPMENT

STRATIGRAPHIC COMPONENT (Ma)

STRUCTURAL COMPONENT (Ma)

BEGIN	PEAK	END
<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Table 17c: Input risking values for the Beaufortian Upper Jurassic Topset SW Play
NPRA Assessment Form-2001

Play: **Beaufortian Upper Jurassic Topset SW**

RISKING

MINIMUM ACCUMULATION SIZE, MAS (Millions of BBL in place)

50

PRERISKED FREQUENCY DISTRIBUTION (Oil plus Gas)

NUM OF PROSPECTS > MINIMUM SIZE	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
	Est Shape	Min	50	5	Max
	2	18	33	50	75
					3

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

ATTRIBUTES

PLAY
ATTRIBUTES

CHARGE (C)
TRAP (T)
TIMING (F)

Probability that play contains at least 1 reservoir >= minimum size (CxTxF)

PROBABILITY OF FAVORABLE

Computed

1
1
1

1

PROSPECT
ATTRIBUTES

CHARGE (c)
TRAP (t)
TIMING (f)

Probability that a randomly chosen prospect is favorable (cxtxf)

0.5
0.5
1

0.25

Play Attributes x Prospect Attributes (CxTxFxcxtxf)

0.25

FRACTION OF ACCUMULATIONS BEING OIL

Fraction NA Gas=1-Fraction(Oil)

0

1

Allocation (percent):

	Land	Oil	Gas
Federal	97		93
State	2		5
Native	1		2

Assessor's Name:

Dave Houseknecht

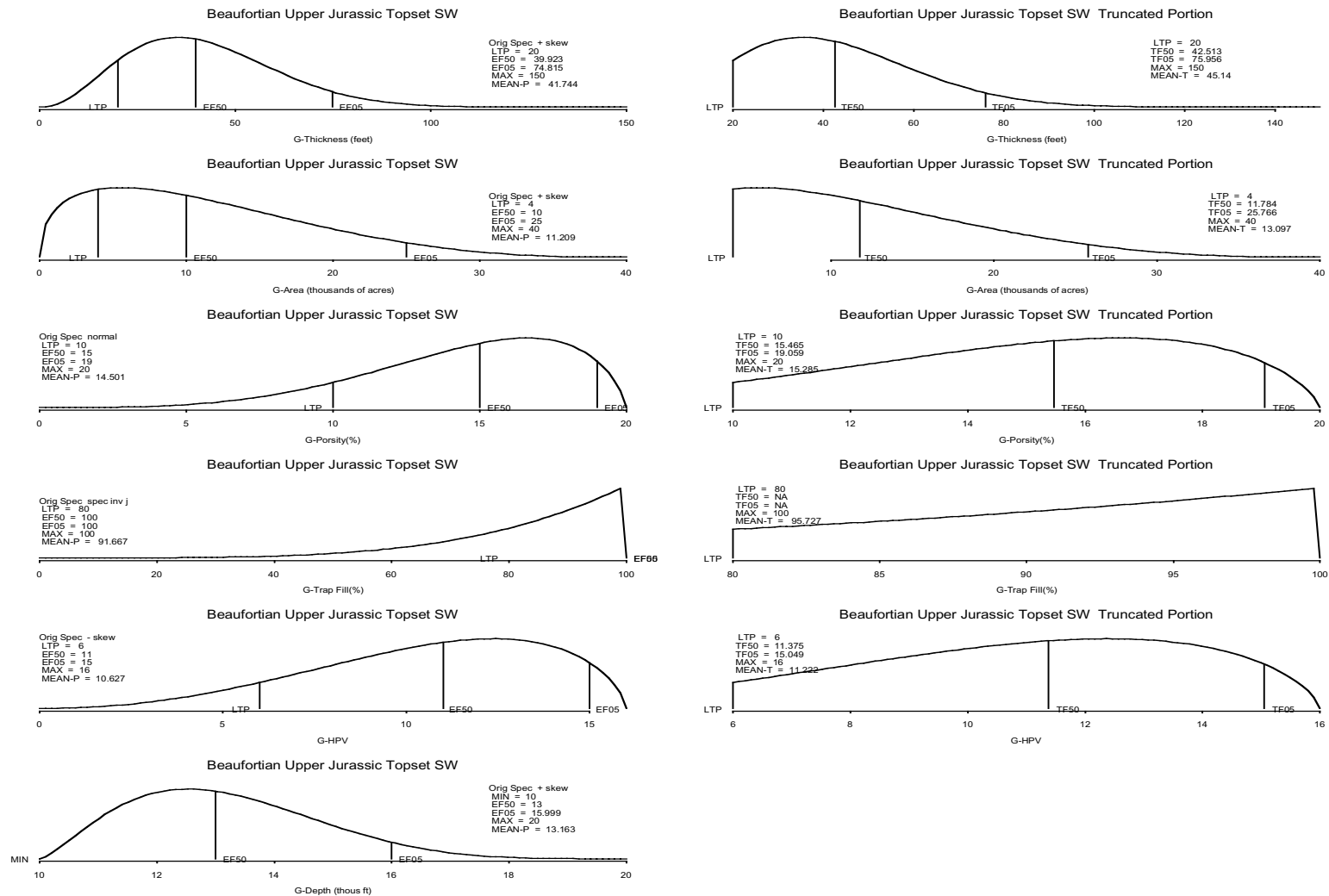
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10/19/01

Date of Simulation Run MM/DD/YYYY:

2/20/02

Table 17d: Distribution of fitted hydrocarbon volume attributes, trap depth, and number of prospects for the Beaufortian Upper Jurassic Topset SW Play



Beaufortian Upper Jurassic Topset SW

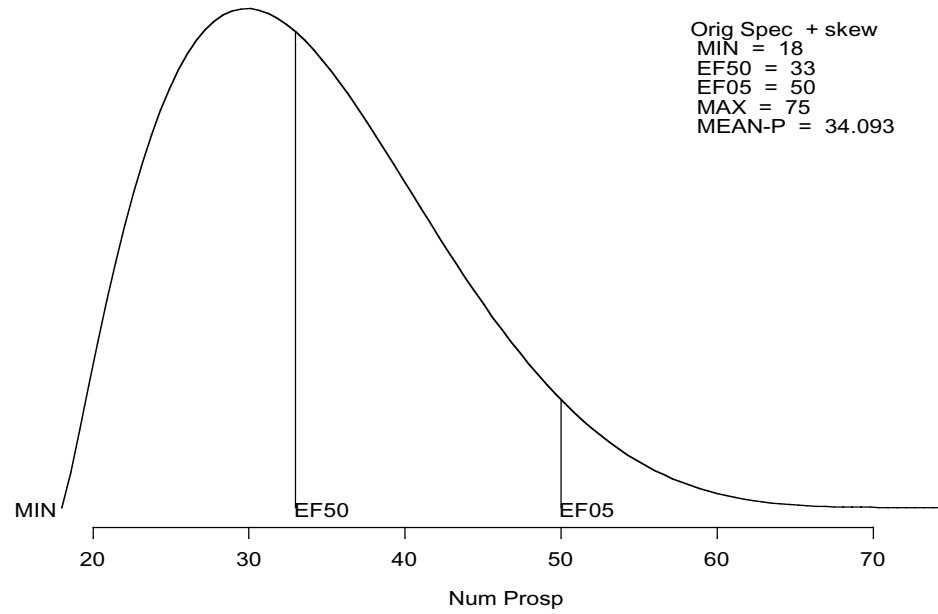
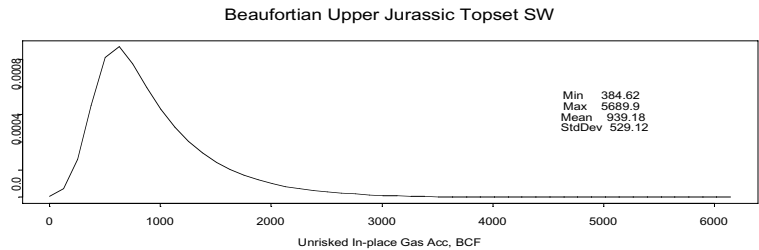


Table 17e: Estimated undiscovered oil and gas resources for the Beaufortian Upper Jurassic Topset SW Play
Deposit



Play Stats						
Resource	Unit	Mean	StdDev	F95	F50	F05
In-place oil	MMBO	0.00	0.00	0.00	0.00	0.00
In-place NA gas	BCFG	8030.01	3479.21	3089.60	7646.46	14253.49
Recov oil	MMBO	0.00	0.00	0.00	0.00	0.00
Recov assoc diss gas	BCFG	0.00	0.00	0.00	0.00	0.00
Recov NA gas	BCFG	5219.51	2261.49	2008.24	4970.20	9264.77
Recov NGL (ADG)	MMBO	0.00	0.00	0.00	0.00	0.00
Recov NGL (NAG)	MMBO	125.50	54.74	47.77	119.36	224.07
Num oil deposits		0.00	0.00	0.00	0.00	0.00
Num NA gas deposits		8.55	3.33	4.00	8.00	15.00

RNS = 921

Play Totals Beaufortian Upper Jurassic Topset SW

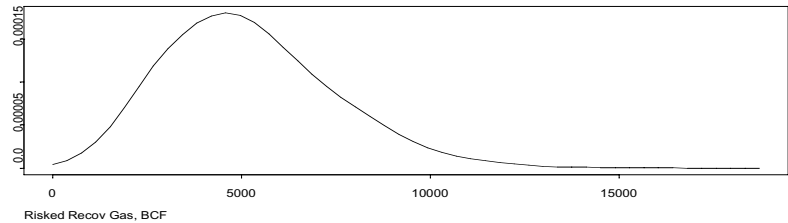


Table 17f: Estimated undiscovered oil and gas resources for the Beaufortian Upper Jurassic Topset SW showing number of deposits and volumes by accumulation size class

Start size class	Oil deposits	Oil (MMBO_	Start size class	Gas deposits	NA Gas (BCFG)
0			0	0.00	0.00
8			48	0.00	0.00
16			96	0.00	0.00
32			192	2.51	788.24
64			384	4.01	2178.80
128			768	1.82	1861.04
256			1536	0.21	387.00
512			3072	0.00	4.96
Totals	0.00	0.00		8.55	5220.03

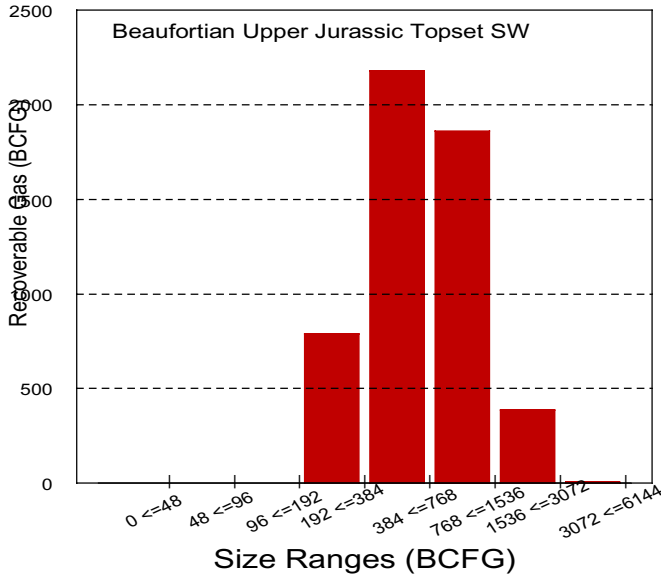
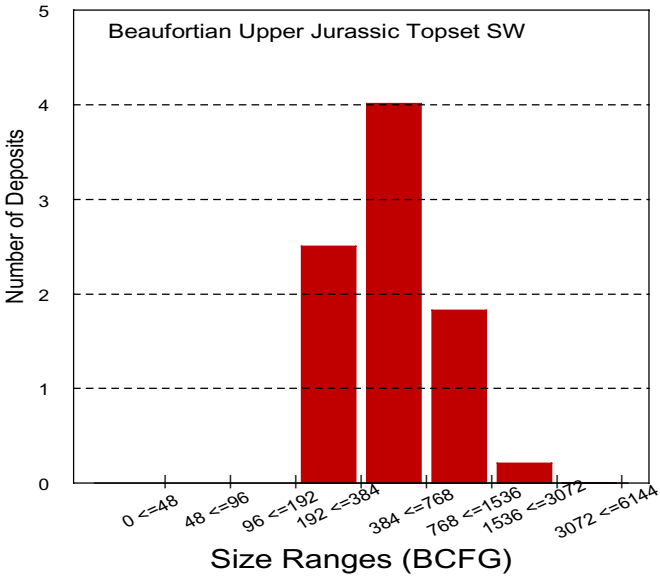


Table 18a: Input values for oil accumulations in the Beaufortian Lower Jurassic Topset Play
NPRA Assessment Form-2001

PLAY:	Beaufortian Lower Jurassic Topset
Play area:	9278 10 ³ Acres

OIL ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		LTP	0.50	0.05	Max	
NET RESERVOIR THICKNESS ¹	2	15	30	60	100	2
AREA OF CLOSURE ²	2	3	4	8	20	3
POROSITY ^{3,4}	4	15	18	20	22	2
TRAP FILL ³	6	50	75	99	100	2
HYDROCARBON PORE VOL ^{3,4}	4	7	10	12	14	8
Approx mm bbl (fvf=1)		12.2	69.8	442.4	2172.2	
Recov mm bbl at surface		3.0	17.0	107.9	529.9	

1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

TRAP DEPTH (in 1000 ft)	2	3	5	8	14	1
(from sea level)	Surface to sea level correction (1000 ft):					0.113

OIL ACCUMULATION CHARACTERISTICS

Oil recovery factor %

Type of reservoir-drive (check any that apply):
Water: Depletion: Gas expansion:

FVF (Formation volume factor, rb/stb): (at median depth) FVF=0.972+0.000147*F^{1.175}

Pressure(psi)	2500	P=TD*0.5*1000	TD=trap depth (thous ft), P=pressure (psi)
temp(deg F)	125	T=19*TD+30	T=temp deg F LN is log base e
SolGasGr	0.693	SGG=((0.1402*LN(C27+14.7)-0.4227)+(0.1369*LN(C28)+0.0156)+(0.1704*LN(E3 AG=API gravity	
F	576	Uncorrected GOR=SGG*((P+14.7)*10^(0.0125*AG))/(18*10^(0.00091*T)))^(1/0.83)	
		F= Final GOR*(SGG/OG)^0.5+1.25*T OG=141.5/(131.5+AG)	

GOR (Associated gas to oil ratio, cu.ft./bbl, at stp): Final GOR at median depth
 Uncorrected GOR

NGLR (Natural gas liquids to associated gas ratio, bbls/million cu.ft., at stp)= 4.5985*exp(.1711*TD) (median depth)

Oil quality parameters:
API gravity Oil Grav (ratio)
Sulfur content of oil

Associated gas quality parameters:
Hydrogen sulfide %
CO2 contamination %

Other inert gases:
Name: Percent:
Name: Percent:

TIME OF TRAP DEVELOPMENT	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)	205		178
STRUCTURAL COMPONENT (Ma)			

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Note: only enter play name and assessor's name on Oil worksheet

Table 18b: Input values for nonassociated gas accumulations in the Beaufortian Lower Jurassic Topset Play
NPRA Assessment Form-2001

PLAY: Beaufortian Lower Jurassic Topset

NONASSOCIATED GAS ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		LTP	50	5	Max	
NET RESERVOIR THICKNESS ¹	2	15	30	60	100	2
AREA OF CLOSURE ²	2	3	4	8	20	3
POROSITY ^{3,4}	4	15	18	20	22	2
TRAP FILL ³	6	50	75	99	100	2
HYDROCARBON PORE VOL ^{3,4}	4	7	10	12	14	2
Approx in place bcf		0.07	0.39	2.48	12.20	From Oil
Recov bcf at surface		10.5	60.2	381.2	1871.6	8

1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

TRAP DEPTH (in 1000 ft)	2	3	8	13	17	1
(from sea level)	Surface to sea level correction (1000 ft):				0.113	

NONASSOCIATED GAS ACCUMULATION CHARACTERISTICS

NA Gas recovery factor %

Type of reservoir-drive (check any that apply):
Water: Gas expansion:

Natural gas liquids plus condensate to non-associated gas (bbls/million cf) (in place):
NGL-NAG=1.785*TD (at median)

Non-associated gas quality parameters:
Hydrogen sulfide %
CO2 contamination %
Other inert gases:
Name: Percent:
Name: Percent:

Gas fvf Gas fvf= $752.2 \cdot (1 - \exp(-0.05728 \cdot TD))$ TD<=5.67 thous ft
(at median depth) $113.3 + 21.1 \cdot TD - 0.812 \cdot TD^2 + 0.0116 \cdot TD^3$ 5.67<TD<=30
TD=trap depth (thous ft)

TIME OF TRAP DEVELOPMENT

	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)			
STRUCTURAL COMPONENT (Ma)			

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Table 18c: Input risking values for the Beaufortian Lower Jurassic Topset Play

NPRA Assessment Form-2001

Play: **Beaufortian Lower Jurassic Topset**

RISKING

MINIMUM ACCUMULATION SIZE, MAS (Millions of BBL in place)

50

PRERISKED FREQUENCY DISTRIBUTION (Oil plus Gas)

NUM OF PROSPECTS > MINIMUM SIZE	Est Shape	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		Min	50	5	Max	
	2	15	40	65	90	3

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

ATTRIBUTES

PLAY
ATTRIBUTES

CHARGE (C)
TRAP (T)
TIMING (F)

Probability that play contains at least 1 reservoir >= minimum size (CxTxF)

PROBABILITY OF FAVORABLE

Computed

1
0.9
1

0.9

PROSPECT
ATTRIBUTES

CHARGE (c)
TRAP (t)
TIMING (f)

Probability that a randomly chosen prospect is favorable (cxtxf)

0.7
0.2
1

0.14

Play Attributes x Prospect Attributes (CxTxFxcxtxf)

0.126

FRACTION OF ACCUMULATIONS BEING OIL

Fraction NA Gas=1-Fraction(Oil)

0.5

0.5

Allocation (percent):

	Land	Oil	Gas
Federal	87	81	80
State	7	12	9
Native	6	7	11

Assessor's Name:

Dave Houseknecht

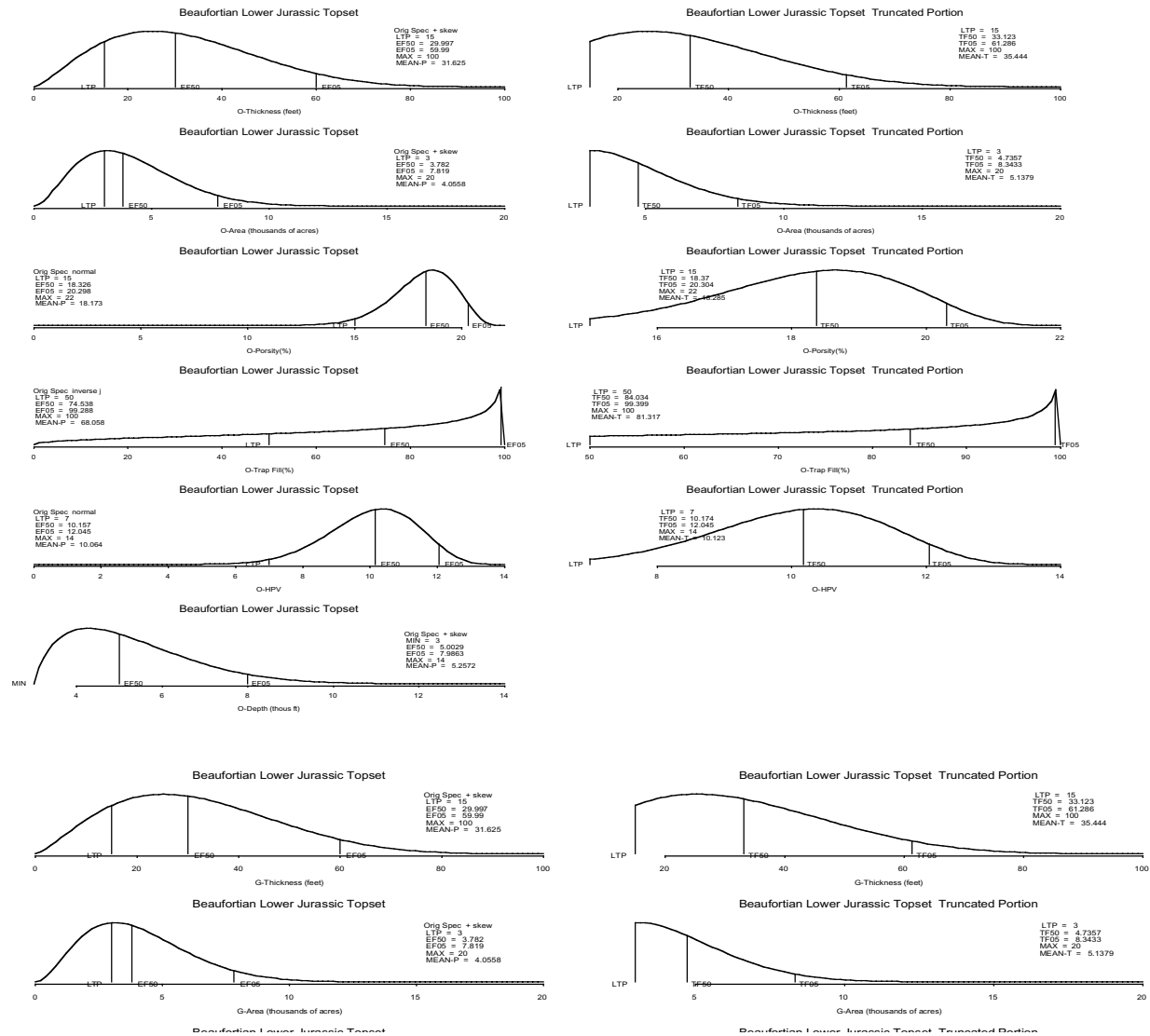
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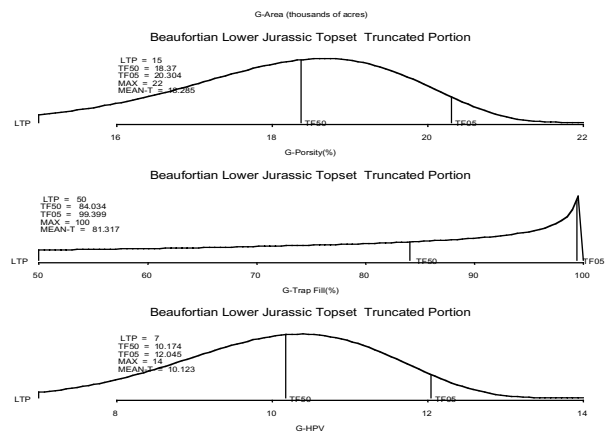
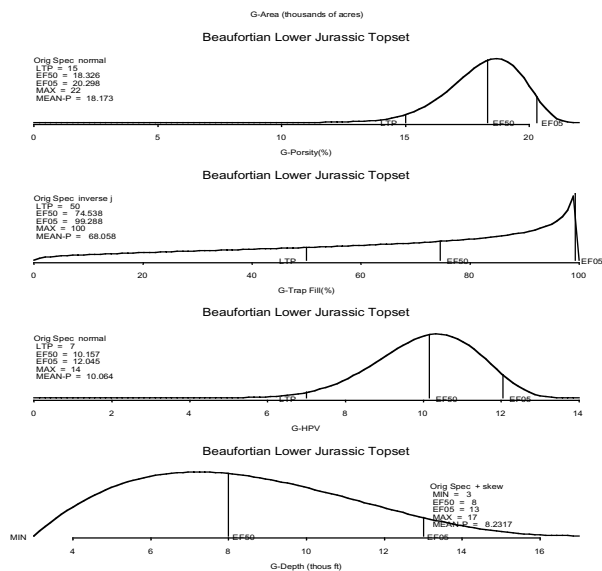
10/19/01

Date of Simulation Run MM/DD/YYYY:

2/26/02

Table 18d: distribution of fitted hydrocarbon volume attributes, trap depth, and number of prospects for the Beaufortian Lower Jurassic Topset Play





Beaufortian Lower Jurassic Topset

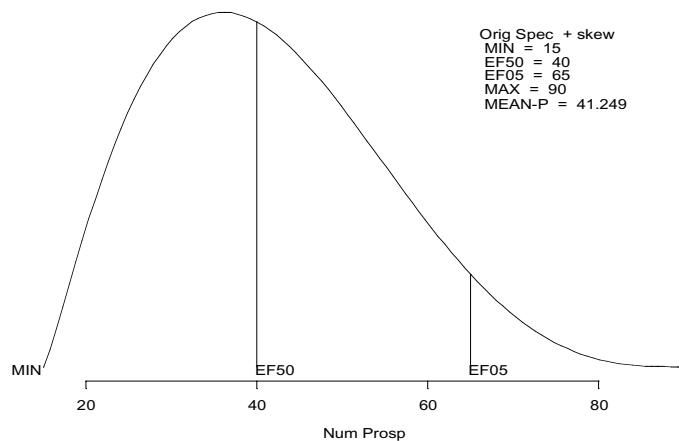
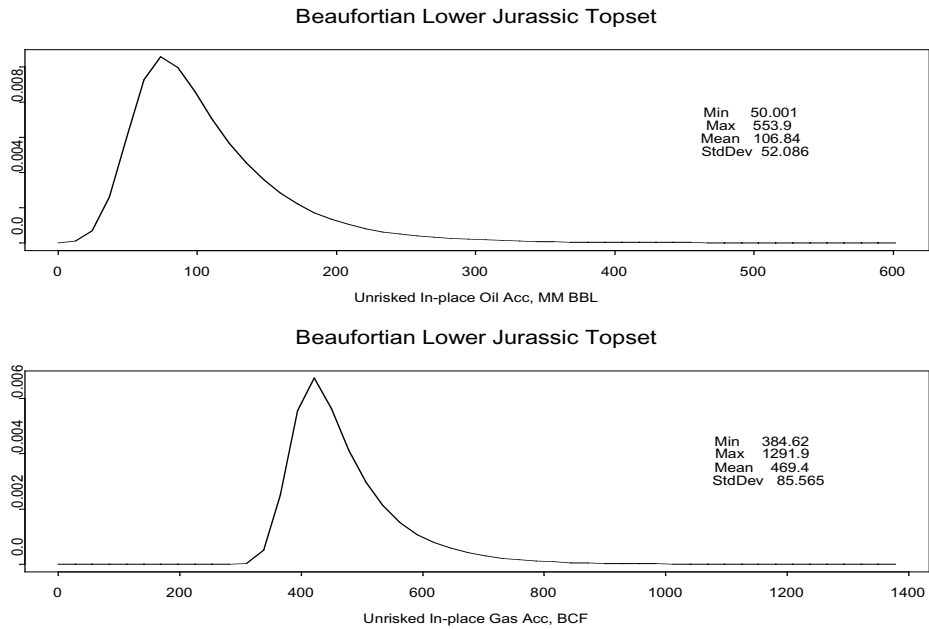


Table 18e: Estimated undiscovered oil and gas resources for the Beaufortian Lower Jurassic Topset Play
Deposit



Play						
Play Stats						
Resource	Unit	Mean	StdDev	F95	F50	F05
In-place oil	MMBO	275.63	225.37	0.00	242.39	699.53
In-place NA gas	BCFG	1219.89	941.86	0.00	1082.50	2945.89
Recov oil	MMBO	82.69	67.61	0.00	72.72	209.86
Recov assoc diss gas	BCFG	2.53	12.11	0.00	0.00	15.39
Recov NA gas	BCFG	792.93	612.21	0.00	703.62	1914.83
Recov NGL (ADG)	MMBO	0.96	0.79	0.00	0.83	2.45
Recov NGL (NAG)	MMBO	13.86	10.95	0.00	12.55	34.08
Num oil deposits		2.58	1.97	0.00	2.00	6.00
Num NA gas deposits		2.60	1.99	0.00	2.00	6.00

RNS = 774

Play Totals Beaufortian Lower Jurassic Topset

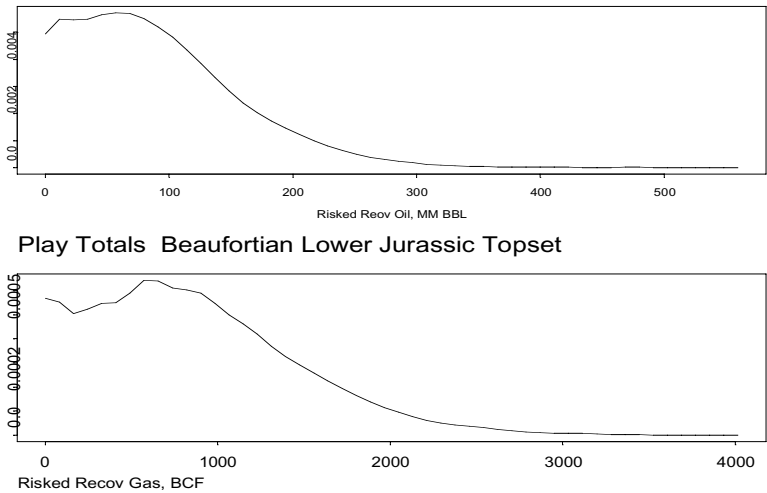


Table 18f: Estimated undiscovered oil and gas resources for the Beaufortian Lower Jurassic Topset Play showing number of deposits and volumes by accumulation size class

Start size class	Oil deposits	Oil (MMBO)	Start size class	Gas deposits	NA Gas (BCFG)
0	0.00	0.00	0	0.00	0.00
8	0.11	1.70	48	0.00	0.00
16	1.49	34.51	96	0.00	0.00
32	0.87	37.00	192	2.37	690.91
64	0.12	9.24	384	0.23	101.86
128	0.00	0.25	768	0.00	0.22
256			1536		

Totals	2.58	82.70		2.60	792.99
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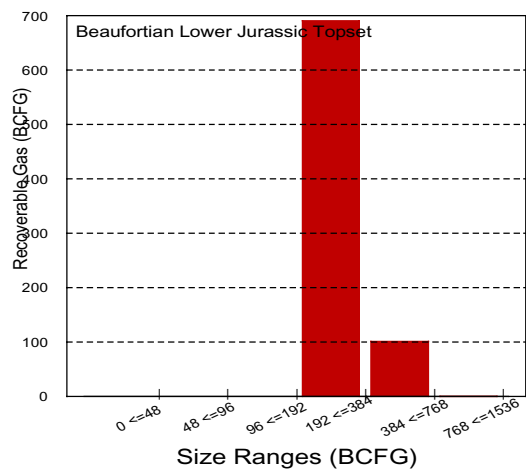
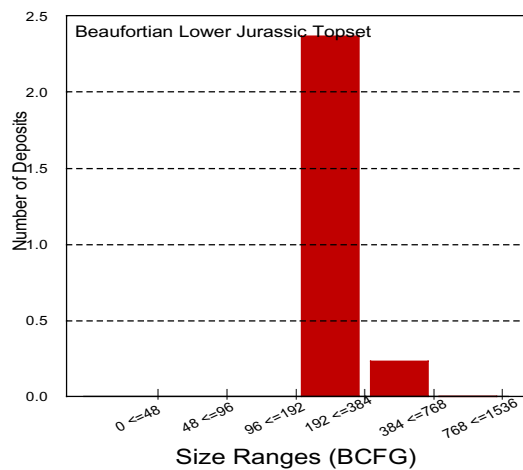
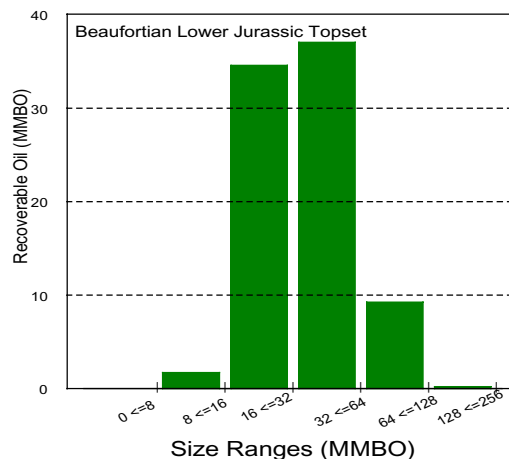
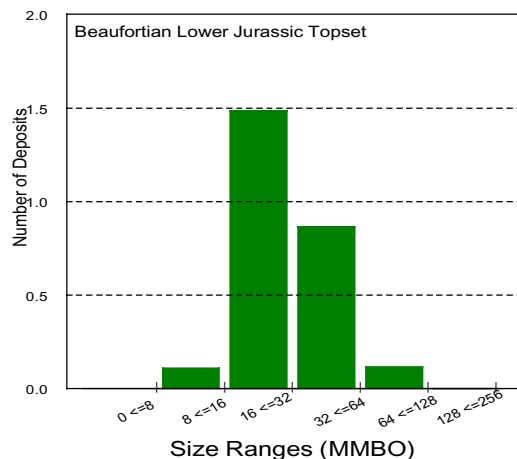


Table 19a: Input values for oil accumulations in the Beaufortian Clinoform Play
NPRA Assessment Form-2001

PLAY:	Beaufortian Clinoform
Play area:	7880 10 ³ Acres

OIL ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		LTP	0.50	0.05	Max	
NET RESERVOIR THICKNESS ¹	2	15	40	70	150	3
AREA OF CLOSURE ²	2	5	10	15	25	3
POROSITY ^{3,4}	4	8	13	17	19	3
TRAP FILL ³	6	50	75	99	100	3
HYDROCARBON PORE VOL ^{3,4}	4	3	8	12	14	5
Approx mm bbl (fvf=1)		8.7	186.2	967.7	4073.0	
Recov mm bbl at surface		1.8	38.6	200.6	844.3	

1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

TRAP DEPTH (in 1000 ft)	2	8	9	10	12	2
(from sea level)	Surface to sea level correction (1000 ft):				0.431	

OIL ACCUMULATION CHARACTERISTICS

Oil recovery factor %

Type of reservoir-drive (check any that apply):
Water: Depletion: ☒ Gas expansion:

FVF (Formation volume factor, rb/stb): (at median depth) FVF=0.972+0.000147*F^{1.175}

Pressure(psi)	4500	P=TD*0.5*1000	TD=trap depth (thous ft), P=pressure (psi)
temp(deg F)	201	T=19*TD+30	T=temp deg F LN is log base e
SolGasGr	0.757	SGG=((0.1402*LN(C27+14.7)-0.4227)+(0.1369*LN(C28)+0.0156)+(0.1704*LN(E37)-AG=API gravity	
F	1376	Uncorrected GOR=SGG*((P+14.7)*10 ^{0.0125*AG} /(18*10 ^{0.00091*T})) ^{1/0.83}	

F= Final GOR*(SGG/OG)^{0.5+1.25*T} OG=141.5/(131.5+AG)

GOR (Associated gas to oil ratio, cu.ft./bbl, at stp): Final GOR at median depth
 Uncorrected GOR

NGLR (Natural gas liquids to associated gas ratio, bbls/million cu.ft., at stp)= 4.5985*exp(.1711*TD) (median depth)

Oil quality parameters:
API gravity Oil Grav (ratio)
Sulfur content of oil

Associated gas quality parameters:
Hydrogen sulfide %
CO2 contamination %
Other inert gases:
Name: Percent:
Name: Percent:

	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)	205		178
STRUCTURAL COMPONENT (Ma)			

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Note: only enter play name and assessor's name on Oil worksheet

Table 19b: Input values for nonassociated gas accumulations in the Beaufortian Clinoform Play
NPRA Assessment Form-2001
PLAY: Beaufortian Clinoform

NONASSOCIATED GAS ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		LTP	50	5	Max	
NET RESERVOIR THICKNESS ¹	2	15	40	70	150	3
AREA OF CLOSURE ²	2	5	10	15	25	3
POROSITY ^{3,4}	4	8	13	17	19	3
TRAP FILL ³	6	50	75	99	100	3
HYDROCARBON PORE VOL ^{3,4}	4	3	8	12	14	
Approx in place bcf		0.05	1.05	5.43	22.87	
Recov bcf at surface		8.6	183.2	952.3	4007.8	
1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0 5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point						
TRAP DEPTH (in 1000 ft) (from sea level)	2	8	12	16	18	2
Surface to sea level correction (1000 ft):					0.431	

NONASSOCIATED GAS ACCUMULATION CHARACTERISTICS

NA Gas recovery factor %

Type of reservoir-drive (check any that apply):
Water: Gas expansion:

Natural gas liquids plus condensate to non-associated gas (bbbls/million cf) (in place):
NGL-NAG=1.785*TD (at median)

Non-associated gas quality parameters:
Hydrogen sulfide %
CO2 contamination %
Other inert gases:
Name: Percent:
Name: Percent:

Gas fvf Gas fvf= $752.2 \cdot (1 - \exp(-0.05728 \cdot TD))$ TD ≤ 5.67 thous ft
(at median depth) $113.3 + 21.1 \cdot TD - 0.812 \cdot TD^2 + 0.0116 \cdot TD^3$ 5.67 < TD ≤ 30
TD=trap depth (thous ft)

TIME OF TRAP DEVELOPMENT

	BEGIN	PEAK	END
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STRUCTURAL COMPONENT (Ma)	<input type="text"/>	<input type="text"/>	<input type="text"/>

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Table 19c: Input risking values for the Beaufortian Clinoform Play
NPRA Assessment Form-2001

Play: **Beaufortian Clinoform**

RISKING

MINIMUM ACCUMULATION SIZE, MAS (Millions of BBL in place)

50

PRERISKED FREQUENCY DISTRIBUTION (Oil plus Gas)

NUM OF PROSPECTS > MINIMUM SIZE	Est Shape	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
	Min	50	5	Max		
	2	10	25	50	75	3

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

ATTRIBUTES

PLAY CHARGE (C)
 ATTRIBUTES TRAP (T)
 TIMING (F)

Probability that play contains at least 1 reservoir >= minimum size (CxTxF)

PROBABILITY OF FAVORABLE

Computed

1
0.9
1

0.9

PROSPECT CHARGE (c)
 ATTRIBUTES TRAP (t)
 TIMING (f)

Probability that a randomly chosen prospect is favorable (cxtxf)

1
0.1
1

0.1

Play Attributes x Prospect Attributes (CxTxFxcxtxf)

0.09

FRACTION OF ACCUMULATIONS BEING OIL

Fraction NA Gas=1-Fraction(Oil)

0.1

0.9

Allocation (percent):

	Land	Oil	Gas
Federal	97	65	94
State	2	20	4
Native	1	15	2

Assessor's Name:

Dave Houseknecht

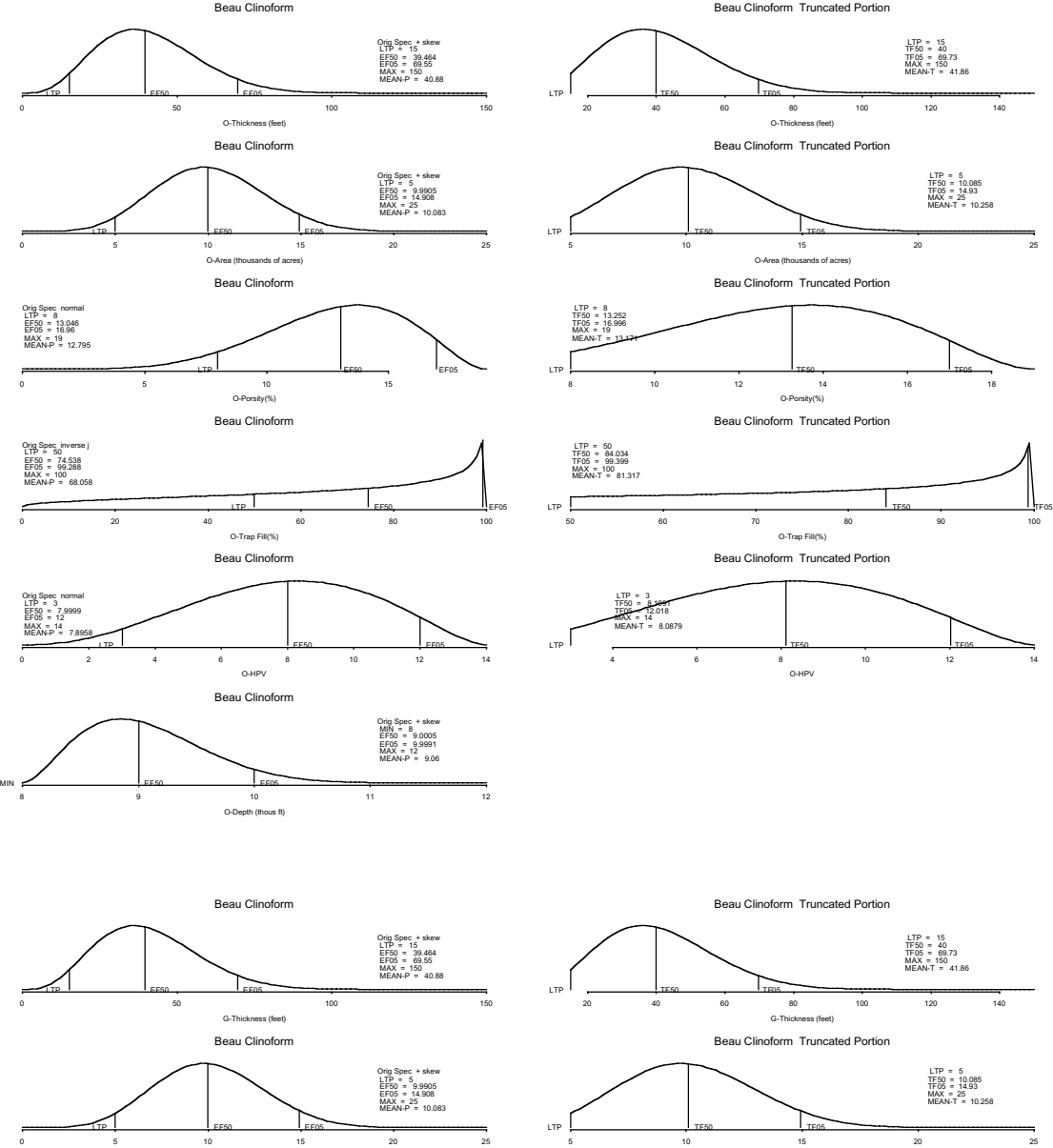
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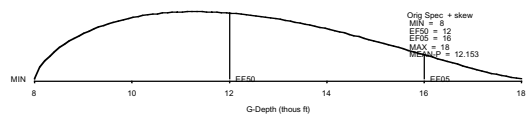
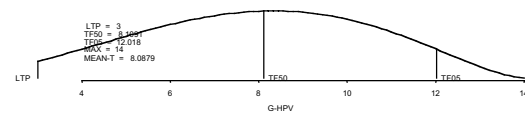
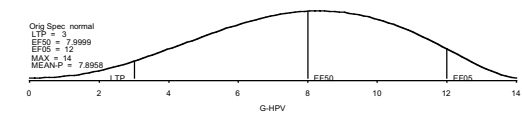
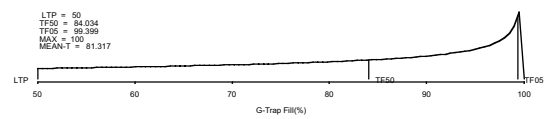
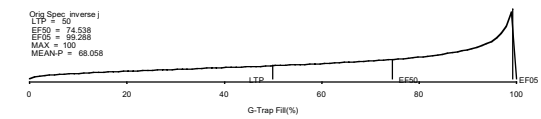
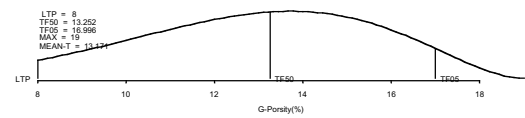
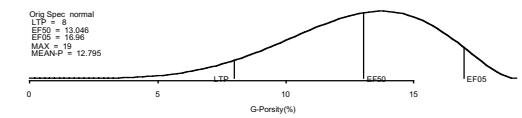
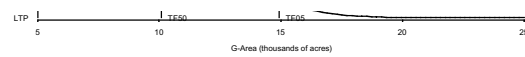
10/19/01

Date of Simulation Run MM/DD/YYYY:

1/19/02

Table 19d: Distribution of fitted hydrocarbon volume attributes, trap depth, and number of prospects for the Beaufortian Clinoform Play





Beau Clinoform

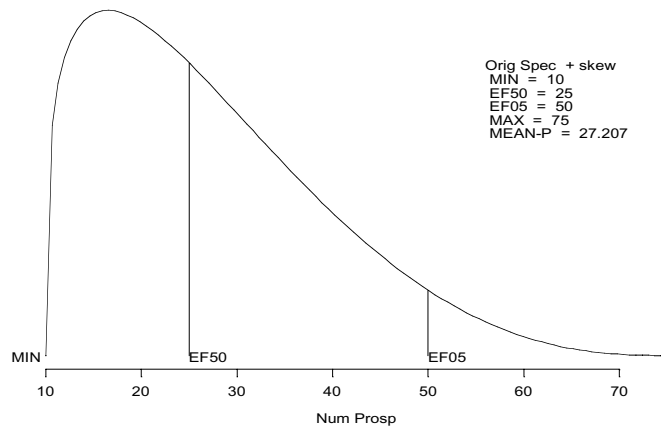
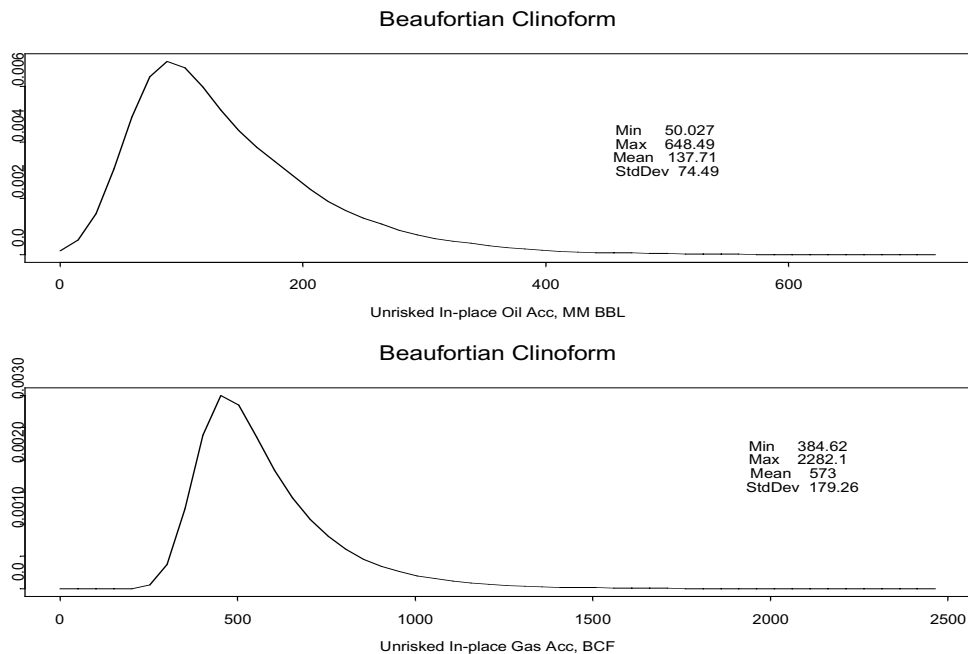


Table 19e: Estimated undiscovered oil and gas resources for the Beaufortian Clinoform Play

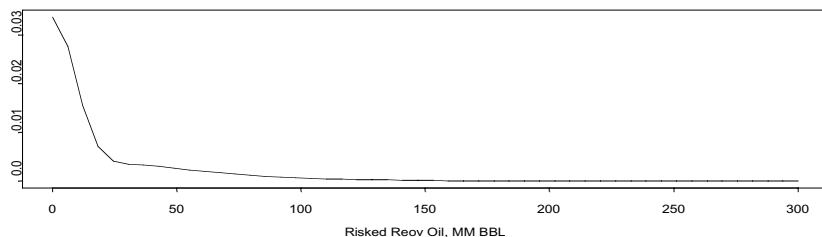
Deposit



Play Stats						
Resource	Unit	Mean	StdDev	F95	F50	F05
In-place oil	MMBO	33.53	79.76	0.00	0.00	203.33
In-place NA gas	BCFG	1264.60	1106.59	0.00	1054.77	3354.29
Recov oil	MMBO	11.74	27.92	0.00	0.00	71.16
Recov assoc diss gas	BCFG	14.93	35.50	0.00	0.00	90.21
Recov NA gas	BCFG	821.99	719.28	0.00	685.60	2180.29
Recov NGL (ADG)	MMBO	0.27	0.65	0.00	0.00	1.66
Recov NGL (NAG)	MMBO	18.83	16.66	0.00	15.59	50.24
Num oil deposits		0.24	0.51	0.00	0.00	1.00
Num NA gas deposits		2.21	1.88	0.00	2.00	6.00

RNS = 774

Play Totals Beaufortian Clinoform



Play Totals Beaufortian Clinoform

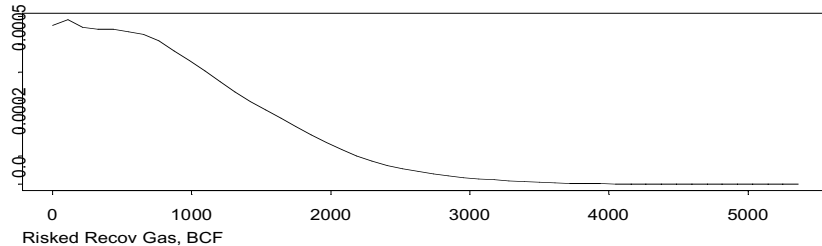


Table 19f: Estimated undiscovered oil and gas resources for the Beaufortian Clinoform Play showing number of deposits and volumes by accumulation size class

Start size class	Oil deposits	Oil (MMBO)	Start size class	Gas deposits	NA Gas (BCFG)
0	0.00	0.00	0	0.00	0.00
8	0.00	0.00	48	0.00	0.00
16	0.08	1.98	96	0.00	0.00
32	0.11	5.05	192	1.45	445.28
64	0.05	4.18	384	0.73	354.49
128	0.00	0.52	768	0.03	22.28
256			1536		
Totals	0.24	11.74		2.21	822.06

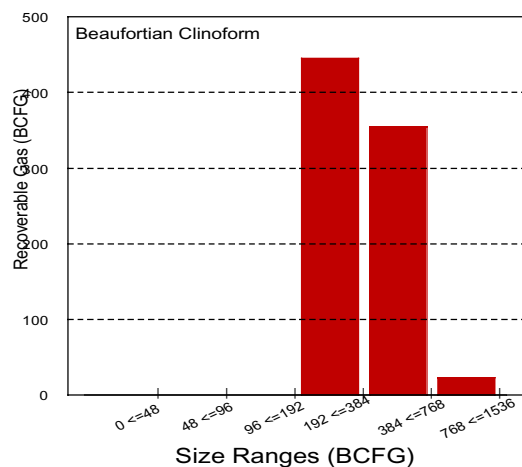
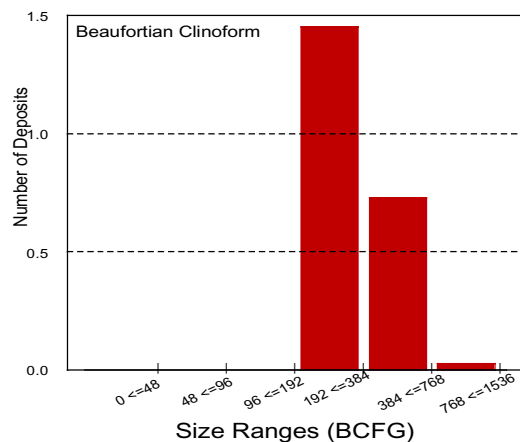
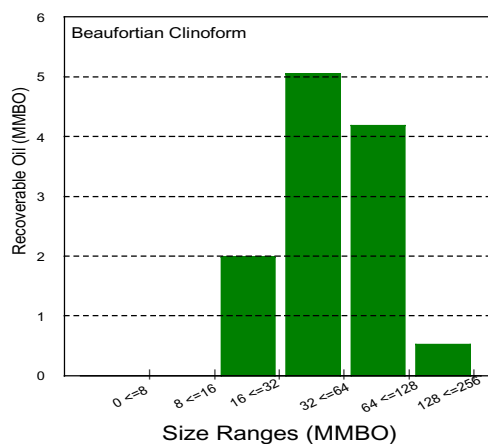
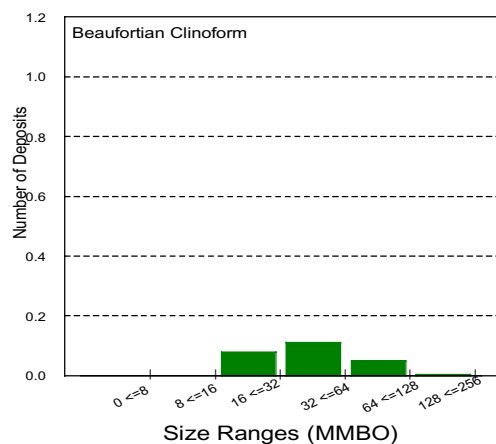


Table 20a: Input values for oil accumulations in the Brookian topset Structural Play
NPRA Assessment Form-2001

PLAY:	Brookian Topset Structural
Play area:	13388 10 ³ Acres

OIL ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 6)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵	
		LTP	50	5	Max		
NET RESERVOIR THICKNESS ¹	2	25	100	400	500	2	-0.5 Corr(NRT,HPV)
AREA OF CLOSURE ²	2	2	7	30	75	1	
POROSITY ^{3,4}	4	12	14	17	20	2	
TRAP FILL ³	2	20	40	80	100	3	Enter POR*Sw
HYDROCARBON PORE VOL ^{3,4}	4	6	8	11	14		6
Approx mm bbl (fvf=1)		4.7	173.8	8192.4	40729.5		
Recov mm bbl at surface		1.5	56.4	2660.0	13224.4		

1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

TRAP DEPTH (in 1000 ft)	2	0.5	2	10	12	1
(from sea level)	Surface to sea level correction (1000 ft):					0.9

OIL ACCUMULATION CHARACTERISTICS

Oil recovery factor %

Type of reservoir-drive (check any that apply):
Water: Depletion: Gas expansion:

FVF (Formation volume factor, rb/stb):

Pressure(psi)	1000
temp(deg F)	68
SolGasGr	0.634
F	271

$P=TD*0.5*1000$ $TD=$ trap depth (thous ft), $P=$ pressure (psi)
 $T=19*TD+30$ $T=$ temp deg F LN is log base e
 $SGG=((0.1402*LN(C27+14.7)-0.4227)+(0.1369*LN(C28)+0.0156)+(0.1704*LN(E3 AG=API gravity$
Uncorrected GOR=SGG*((P+14.7)*10^(0.0125*AG))/(18*10^(0.00091*T))^(1/0.83)
F= Final GOR*(SGG/OG)^0.5+1.25*T OG=141.5/(131.5+AG)

GOR (Associated gas to oil ratio, cu.ft./bbl, at stp):
 Final GOR at median depth
 Uncorrected GOR

NGLR (Natural gas liquids to associated gas ratio, bbls/million cu.ft., at stp)= 4.5985*exp(.1711*TD) (median depth)

Oil quality parameters:
API gravity Oil Grav (ratio)
Sulfur content of oil Umiat value

Associated gas quality parameters:
Hydrogen sulfide %
CO2 contamination %
Other inert gases:
Name: Percent:
Name: Percent:

TIME OF TRAP DEVELOPMENT	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)	108	100	97
STRUCTURAL COMPONENT (Ma)	100	60	45

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Table 20b: Input values for nonassociated gas accumulations in the Brookian Topset Structural Play

PLAY: **Brookian Topset Structural**

NONASSOCIATED GAS ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 6)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵	
		LTP	50	5	Max		
NET RESERVOIR THICKNESS ¹	2	25	125	450	600	2	-0.5 Corr(NRT,HPV)
AREA OF CLOSURE ²	2	2	7	30	75	2	
POROSITY ^{3,4}	4	10	14	17	20	2	
TRAP FILL ³	2	30	50	80	100	3	POR*Sw
HYDROCARBON PORE VOL ^{3,4}	4	4	8	11	14		6
Approx in place bcf		0.03	1.52	51.75	274.43		
Recov bcf at surface		1.3	74.5	2528.0	13406.2		
1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0							
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point							
TRAP DEPTH (in 1000 ft)	2	0.5	2	10	12	1	
(from sea level)	Surface to sea level correction (1000 ft):				0.9		

NONASSOCIATED GAS ACCUMULATION CHARACTERISTICS

NA Gas recovery factor %

Type of reservoir-drive (check any that apply):

Water: Gas expansion:

Natural gas liquids plus condensate to non-associated gas (bbbls/million cf) (in place):

NGL-NAG=1.785*TD (at median)

Non-associated gas quality parameters:

Hydrogen sulfide %

CO2 contamination %

Other inert gases:

Name: Percent:

Name: Percent:

Gas fvf Gas fvf= $752.2*(1-EXP(-0.05728*TD))$ TD<=5.67 thous ft

(at median depth) $113.3+21.1*TD-0.812*TD^2+0.0116*TD^3$ 5.67<TD<=30

TD=trap depth (thous ft)

For Nonassociated Gas Accumulation:

TIME OF TRAP DEVELOPMENT ¹	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (M)	108	100	97
STRUCTURAL COMPONENT (Ma)	100	60	45

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Table 20c: Input risking values for the Brookian Topset Structural Play

NPRA Assessment Form-2001

Play: **Brookian Topset Structural**

RISKING

MINIMUM ACCUMULATION SIZE, MAS (Millions of BBL in place) 50

PRERISKED FREQUENCY DISTRIBUTION (Oil plus Gas)

	PROB OF AND GREATER THAN					Knowledge
NUM OF PROSPECTS	Est Shape	Min	F50	F05	Max	Level 1-3 ⁵
> MINIMUM SIZE	1	70	105	130	180	

5-Knowledge Level: 1=High, 2=Medium, 3=Low

ATTRIBUTES

PLAY CHARGE (C)
 ATTRIBUTES TRAP/ROCK (T)
 TIMING (F)
Probability that play contains at least 1 reservoir >= minimum size (CxTxF)

PROSPECT CHARGE (c)
 ATTRIBUTES TRAP (t)
 TIMING (f)
Probability that a randomly chosen prospect is favorable (cxtxf)

Play Attributes x Prospect Attributes (CxTxFxcxtxf)

PROBABILITY OF FAVORABLE

Computed

1
1
1

1

Separate oil/gas prospect risk

Oil
0.2
0.3
0.7

Gas
0.9
0.2
0.9

0.042

0.162

0.042

0.162

FRACTION OF ACCUMULATIONS BEING OIL

Fraction NA Gas=1-Fraction(Oil)

0.15

0.85

Allocation (percent):

	Land	Oil	Gas
Federal	99	99	99
State	0	0	0
Native	1	1	1

Assessor's Name:

Chris Potter

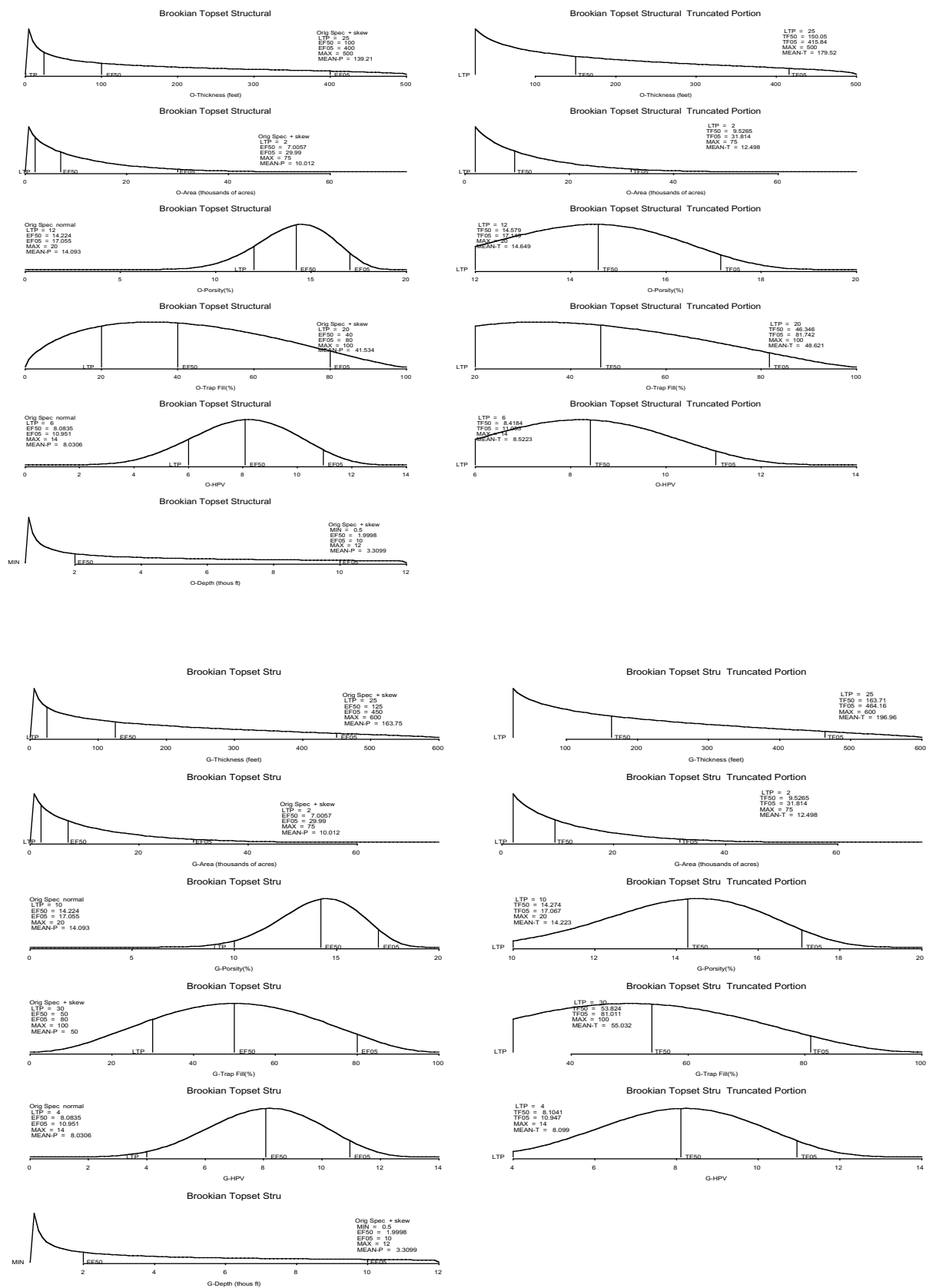
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3/20/02

Date of Simulation Run MM/DD/YYYY:

3/20/02

Table 20d: Distribution of fitted hydrocarbon volume attributes, trap depth, and number of prospects for the Brookian Topset Structural Play



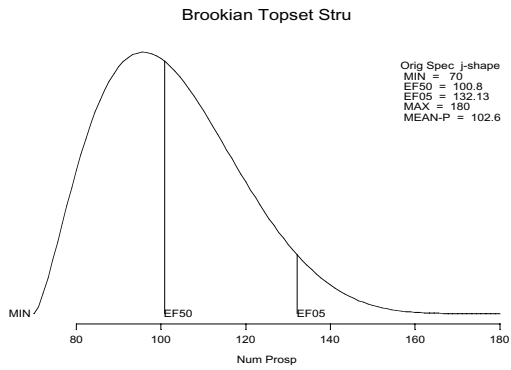
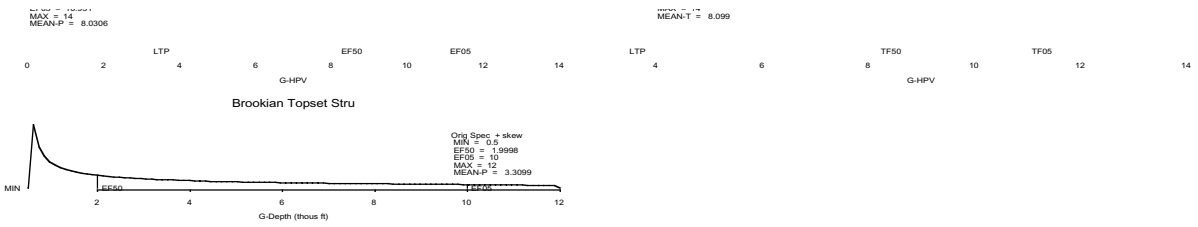
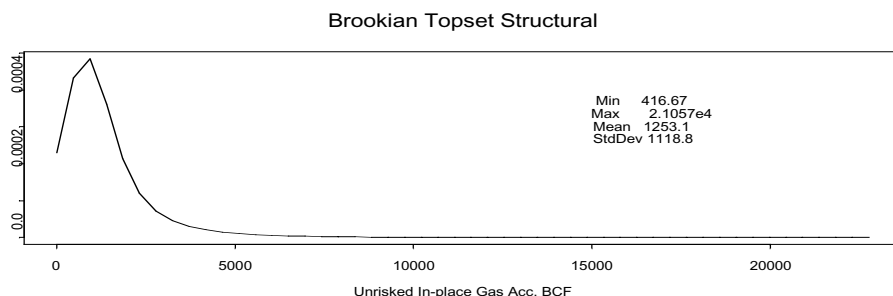
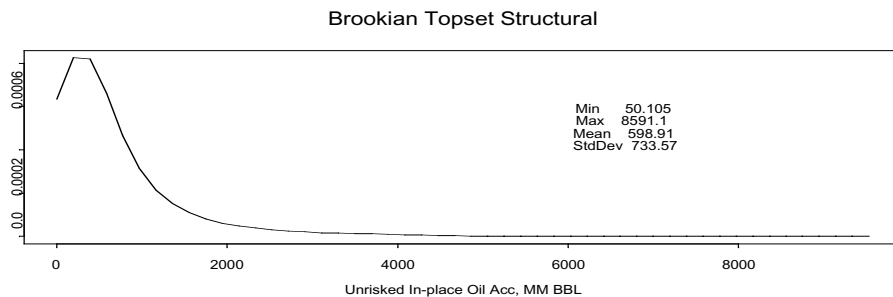


Table 20e: Estimated undiscovered oil and gas resources for the Brookian Topset Structural Play
Deposit



Play Stats						
Resource	Unit	Mean	StdDev	F95	F50	F05
In-place oil	MMBO	391.57	768.39	0.00	0.00	1867.81
In-place NA gas	BCFG	17676.13	6787.35	8001.89	16865.47	30019.64
Recov oil	MMBO	137.05	268.93	0.00	0.00	653.73
Recov assoc diss gas	BCFG	59.88	135.77	0.00	0.00	297.17
Recov NA gas	BCFG	10605.68	4072.41	4801.14	10119.28	18011.78
Recov NGL (ADG)	MMBO	1.37	2.91	0.00	0.00	6.55
Recov NGL (NAG)	MMBO	117.93	55.66	43.15	109.05	221.04
Num oil deposits		0.65	0.81	0.00	0.00	2.00
Num NA gas deposits		14.11	4.19	8.00	14.00	21.00

Random number seed 887

Play Totals Brookian Topset Structural

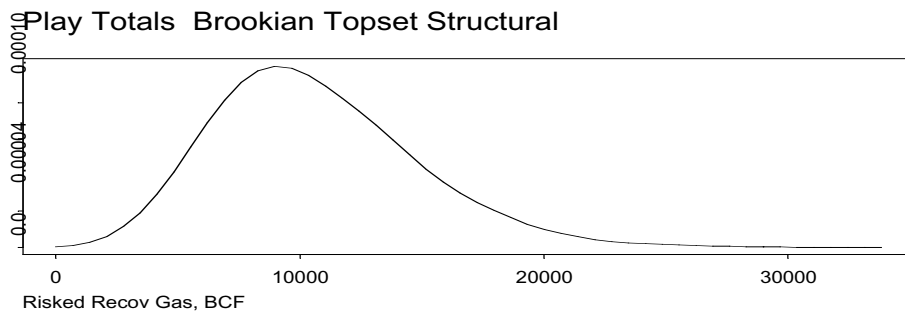
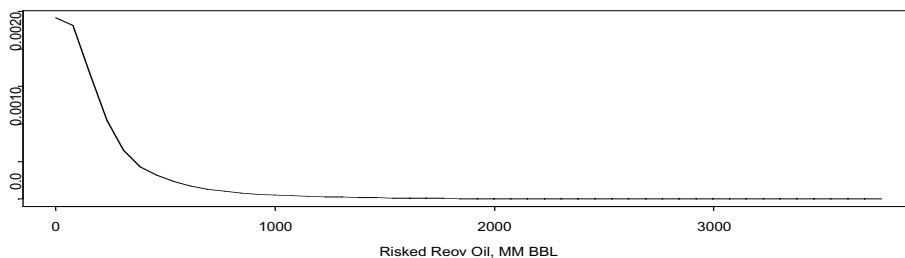


Table 20f: Estimated undiscovered oil and gas resources for the Brookian Topset Structural Play showing number of deposits and volumes by accumulation size class

Start size class	Oil deposits	Oil (MMBO)	Start size class	Gas deposits	NA Gas (BCFG)
0	0.00	0.00	0	0.00	0.00
8	0.00	0.00	48	0.00	0.00
16	0.06	1.57	96	0.00	0.00
32	0.12	5.81	192	4.37	1358.97
64	0.16	14.49	384	5.44	2940.08
128	0.15	26.83	768	2.98	3155.95
256	0.10	37.22	1536	1.08	2227.84
512	0.05	32.06	3072	0.21	834.11
1024	0.01	17.23	6144	0.01	86.20
2048	0.00	1.84	12288	0.00	2.52
Totals	0.65	137.05		14.11	10605.68

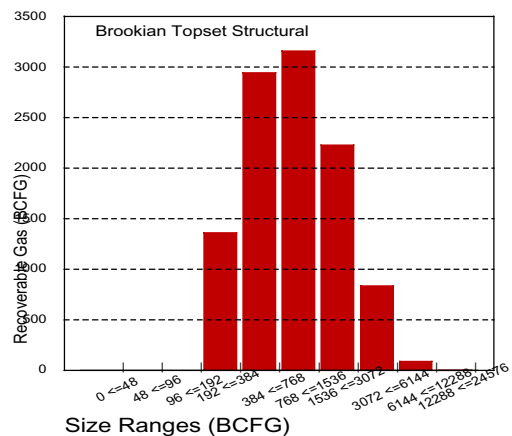
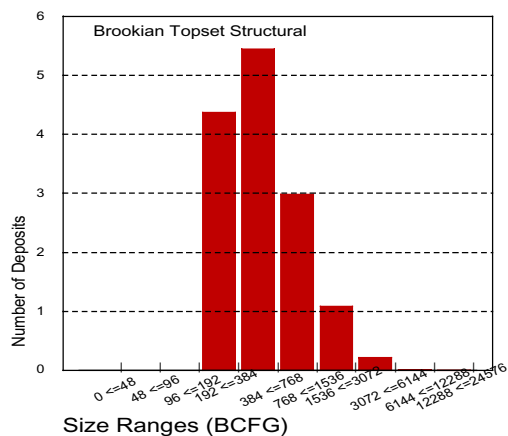
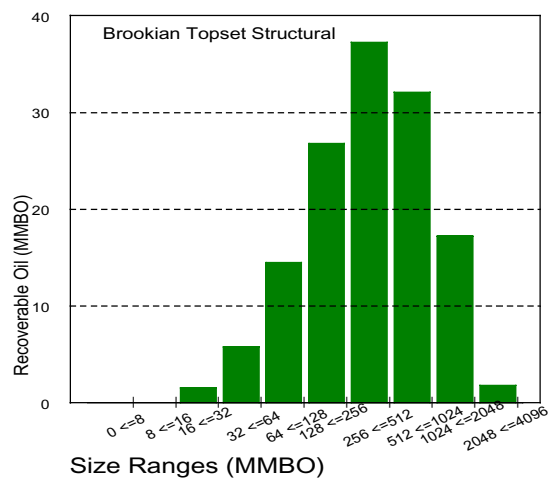
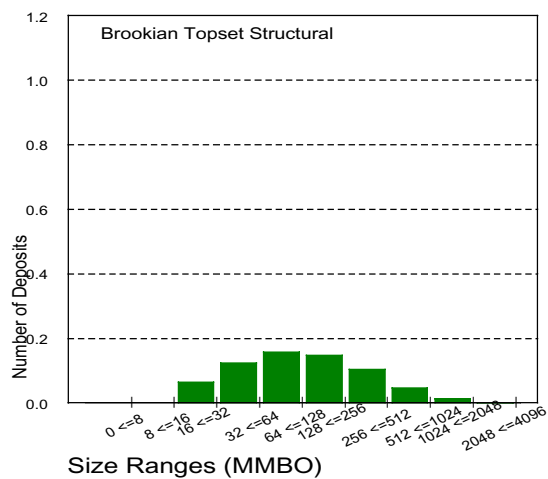


Table 21a: Input values for oil accumulations in the Torok Structural Play
NPRA Assessment Form-2001

PLAY:	Torok Structural
Play area:	14,981 10 ³ Acres

OIL ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 6)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵		
		LTP	50	5	Max			
NET RESERVOIR THICKNESS ¹	2	40	100	250	300	2	-0.5	Corr(NRT,HPV)
AREA OF CLOSURE ²	2	2	5	30	40	1	0.3	Corr(NRT,AC)
POROSITY ^{3,4}	4	10	12	16	20	2		
TRAP FILL ³	4	20	40	80	100	3		Enter POR*Sw
HYDROCARBON PORE VOL ^{3,4}	4	5	7	11	15			5
Approx mm bbl (fvf=1)		6.2	108.6	5120.3	13964.4			
Recov mm bbl at surface		1.5	26.9	1267.4	3456.5			

1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

TRAP DEPTH (in 1000 ft)	4	3	5	9	10	1
(from sea level)	Surface to sea level correction (1000 ft):					0.96

OIL ACCUMULATION CHARACTERISTICS

Oil recovery factor %

Type of reservoir-drive (check any that apply):

Water: Depletion: ☒ Gas expansion:

FVF (Formation volume factor, rb/stb): (at median depth) FVF=0.972+0.000147*F^{1.175}

Pressure(psi)	2500	P=TD*0.5*1000	TD=trap depth (thous ft), P=pressure (psi)
temp(deg F)	125	T=19*TD+30	T=temp deg F LN is log base e
SolGasGr	0.689	SGG=((0.1402*LN(C27+14.7)-0.4227)+(0.1369*LN(C28)+0.0156)+(0.1704*LN(E37)+AG=API gravity	
F	542	Uncorrected GOR=SGG*((P+14.7)*10^(0.0125*AG)/(18*10^(0.00091*T)))^(1/0.83)	

F= Final GOR*(SGG/OG)^0.5+1.25*T OG=141.5/(131.5+AG)

GOR (Associated gas to oil ratio, cu.ft./bbl, at stp): Final GOR at median depth

Uncorrected GOR

NGLR (Natural gas liquids to associated gas ratio, bbls/million cu.ft., at stp)= 4.5985*exp(.1711*TD) (median depth)

Oil quality parameters:

API gravity Oil Grav (ratio)

Sulfur content of oil

Associated gas quality parameters:

Hydrogen sulfide %

CO2 contamination %

Other inert gases:

Name: Percent:

Name: Percent:

TIME OF TRAP DEVELOPMENT

	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)	113	105	102
STRUCTURAL COMPONENT (Ma)	100	60	45

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Table 21b: Input values for nonassociated gas accumulations in the Torok Structural Play

NPRA Assessment Form-2001

PLAY: Torok Structural

NONASSOCIATED GAS ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 6)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵		
		LTP	50	5	Max			
NET RESERVOIR THICKNESS ¹	2	50	200	500	1000	2	-0.5	Corr(NRT,HPV)
AREA OF CLOSURE ²	2	2	5	50	100	1	0.3	Corr(NRT,AC)
POROSITY ^{3,4}	4	8	11	14	17	2		
TRAP FILL ³	4	40	75	85	100	3	POR*Sw	
HYDROCARBON PORE VOL ^{3,4}	4	3	6	9	12		5	
Approx in place bcf		0.05	1.96	83.31	522.72			
Recov bcf at surface		4.8	181.2	7699.0	48307.4			
1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0								
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point								
TRAP DEPTH (in 1000 ft)	3	1	4	15	20	1		
(from sea level)		Surface to sea level correction (1000 ft):				0.96		

NONASSOCIATED GAS ACCUMULATION CHARACTERISTICS

NA Gas recovery factor %

Type of reservoir-drive (check any that apply):

Water:

Gas expansion:

Natural gas liquids plus condensate to non-associated gas (bbbls/million cf) (in place):

NGL-NAG=1.785*TD (at median)

Non-associated gas quality parameters:

Hydrogen sulfide %

CO2 contamination %

Other inert gases:

Name:

Percent:

Name:

Percent:

Gas fvf Gas fvf= $752.2 \cdot (1 - \exp(-0.05728 \cdot TD))$ TD<=5.67 thous ft

(at median depth) $113.3 + 21.1 \cdot TD - 0.812 \cdot TD^2 + 0.0116 \cdot TD^3$ 5.67<TD<=30

TD=trap depth (thous ft)

TIME OF TRAP DEVELOPMENT

STRATIGRAPHIC COMPONENT (Ma)

STRUCTURAL COMPONENT (Ma)

BEGIN	PEAK	END
113	105	102
100	60	45

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Table 21c: Input risking values for the Torok Structural Play

NPRA Assessment Form-2001

Play: Torok Structural

RISKING

MINIMUM ACCUMULATION SIZE, MAS (Millions of BBL in place)

50

PRERISKED FREQUENCY DISTRIBUTION

NUM OF PROSPECTS > MINIMUM SIZE	PROB OF AND GREATER THAN					Knowledge Level 1-3 ⁵
	Est Shape	Min	F50	F05	Max	
	2	60	90	120	150	2

5-Knowledge Level: 1=High, 2=Medium, 3=Low

ATTRIBUTES

PLAY CHARGE (C)
ATTRIBUTES TRAP/ROCK (T)
TIMING (F)
Probability that play contains at least 1 reservoir >= minimum size (CxTxF)

PROBABILITY OF FAVORABLE

Computed

1
0.9
1
0.9

PROSPECT CHARGE (c)
ATTRIBUTES TRAP (t)
TIMING (f)
Probability that a randomly chosen prospect is favorable (cxtxf)

oil	gas
0.2	0.9
0.2	0.2
0.7	0.9
0.028	0.162

Play Attributes x Prospect Attributes (CxTxFxcxtxf)

0.0252 0.1458

FRACTION OF ACCUMULATIONS BEING OIL

Fraction NA Gas=1-Fraction(Oil)

0.1
0.9

Allocation (percent):

	Land	Oil	Gas
Federal	99	99	99
State	0	0	0
Native	1	1	1

Assessor's Name:

Chris Potter

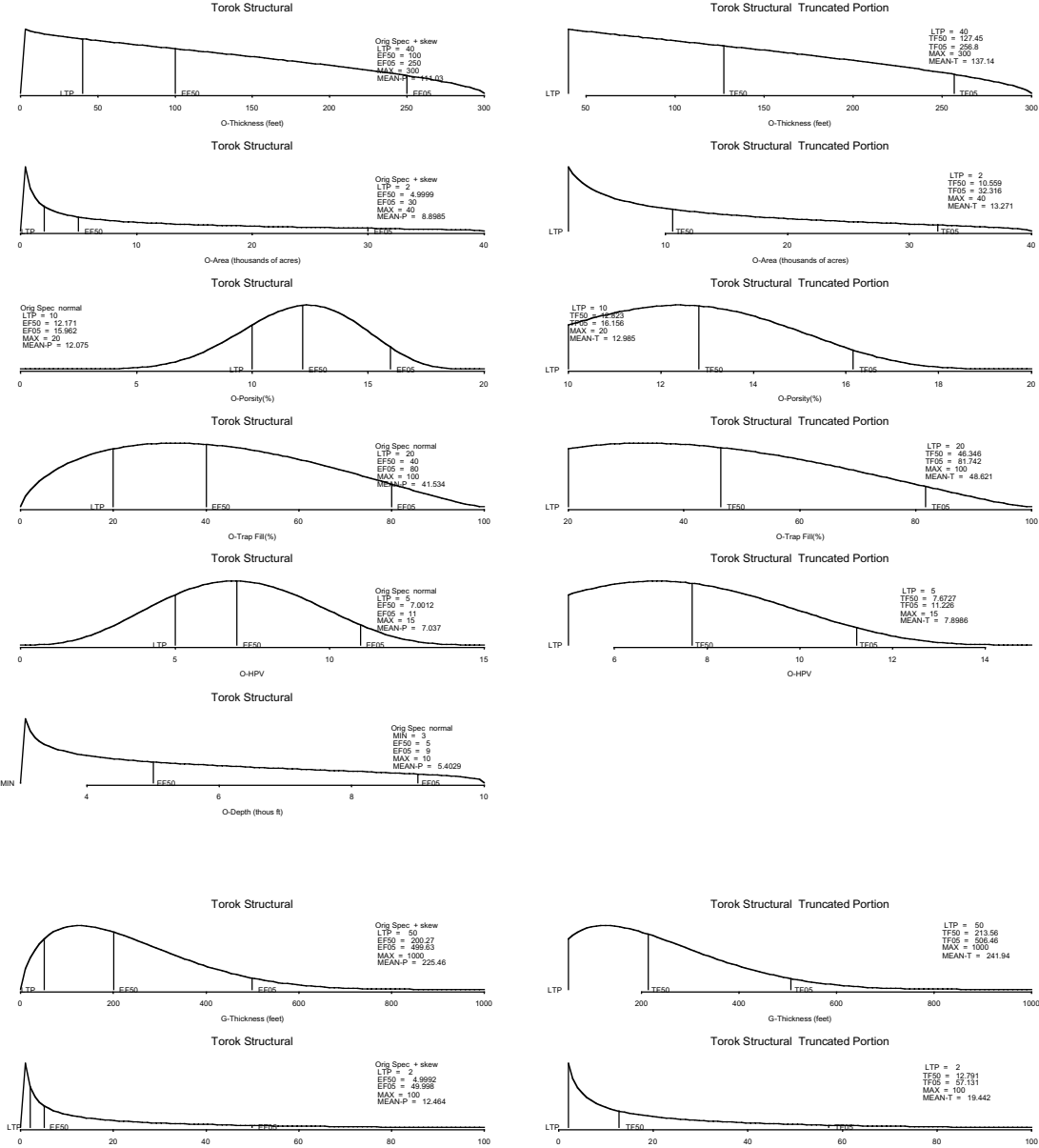
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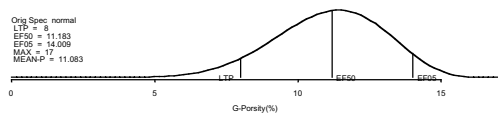
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Table 21d: Distribution of fitted hydrocarbon volume attributes, trap depth and number of prospects for the Torok Structural Play

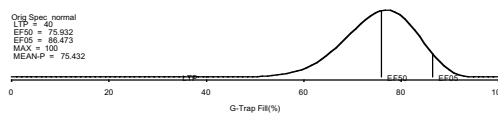




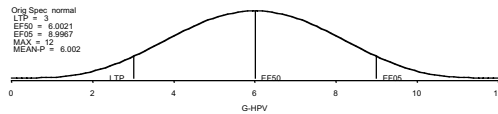
Torok Structural



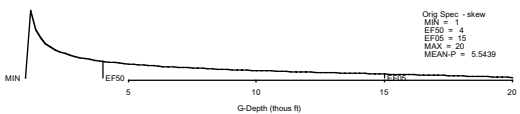
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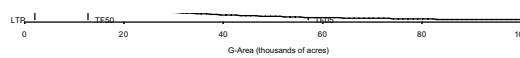
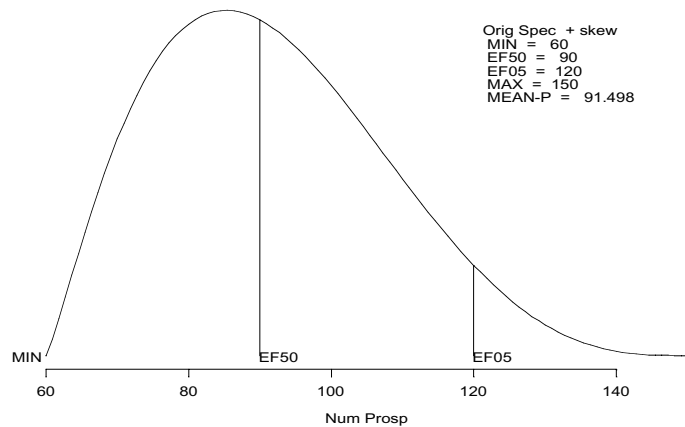
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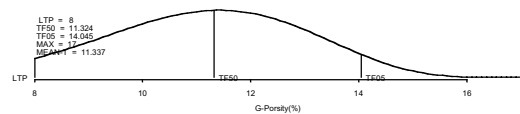
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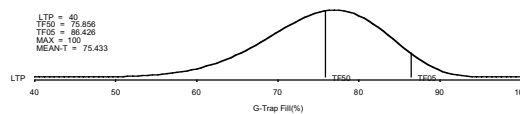
Torok Structural



Torok Structural Truncated Portion



Torok Structural Truncated Portion



Torok Structural Truncated Portion

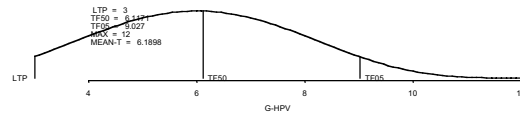
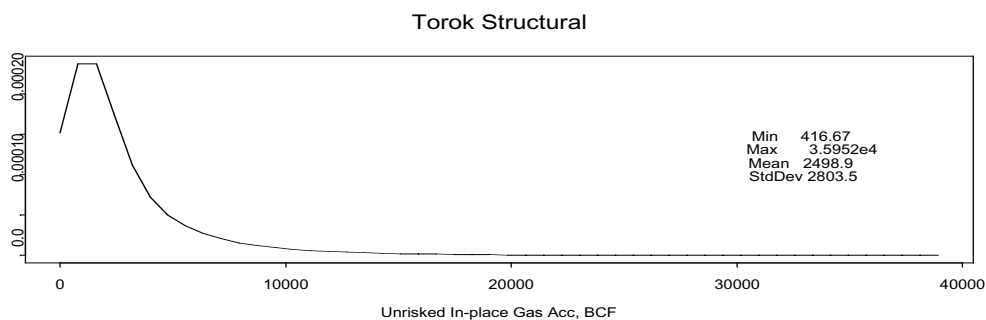
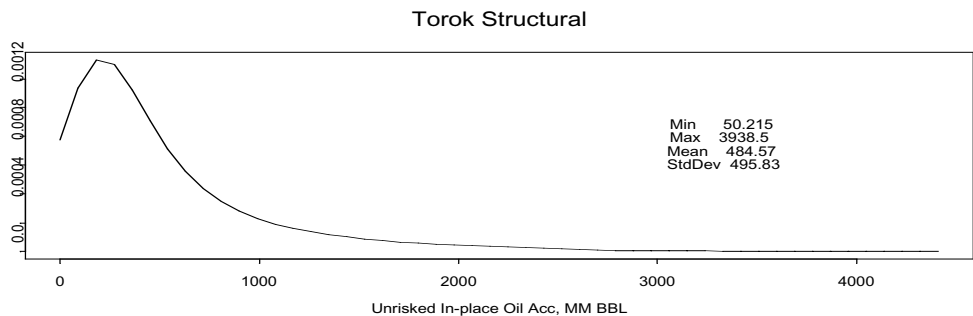


Table 21e: Estimated undiscovered oil and gas resources for the Torok Structural Play

Deposit



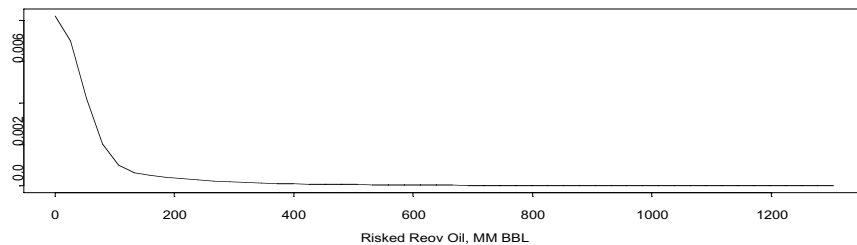
Play

Play Stats

Resource	Unit	Mean	StdDev	F95	F50	F05
In-place oil	MMBO	115.60	338.07	0.00	0.00	741.12
In-place NA gas	BCFG	29842.46	16865.83	0.00	29614.90	58353.64
Recov oil	MMBO	34.68	101.42	0.00	0.00	222.34
Recov assoc diss gas	BCFG	18.70	55.45	0.00	0.00	121.83
Recov NA gas	BCFG	17905.48	10119.50	0.00	17768.94	35012.18
Recov NGL (ADG)	MMBO	0.48	1.45	0.00	0.00	3.14
Recov NGL (NAG)	MMBO	263.70	174.80	0.00	244.18	577.07
Num oil deposits		0.24	0.49	0.00	0.00	1.00
Num NA gas deposits		11.94	5.53	0.00	12.00	20.00

RNS = 70

Play Totals Torok Structural



Play Totals Torok Structural

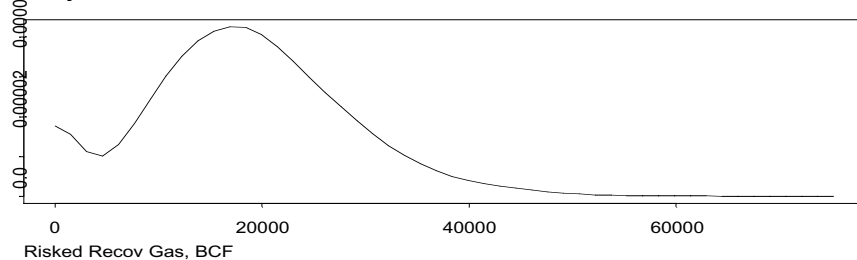


Table 21f: Estimated undiscovered oil and gas resources for the Torok Structural Play showing number of deposits and volumes by accumulation size class

Oil (MMBO)			NA Gas (BCFG)		
Start size class	Oil deposits	Oil (MMBO)	Start size class	Gas deposits	NA Gas (BCFG)
0	0.00	0.00	0	0.00	0.00
8	0.00	0.04	48	0.00	0.00
16	0.03	0.81	96	0.00	0.00
32	0.05	2.34	192	1.93	606.78
64	0.06	5.62	384	3.32	1841.27
128	0.05	9.84	768	3.09	3399.06
256	0.03	10.05	1536	2.17	4683.48
512	0.01	5.69	3072	1.12	4672.24
1024	0.00	0.30	6144	0.29	2343.48
2048			12288	0.02	360.60
Totals	0.24	34.68		11.94	17906.91

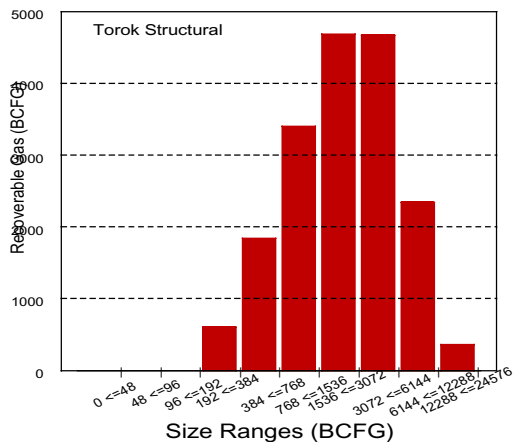
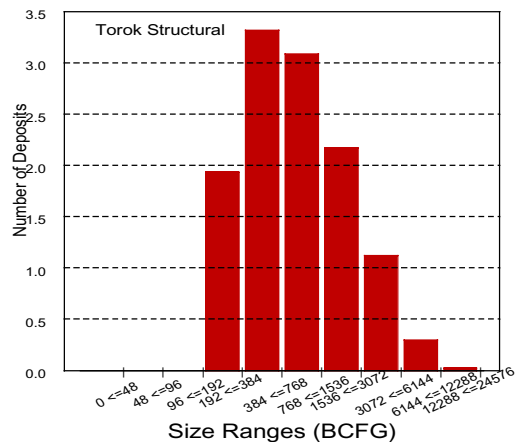
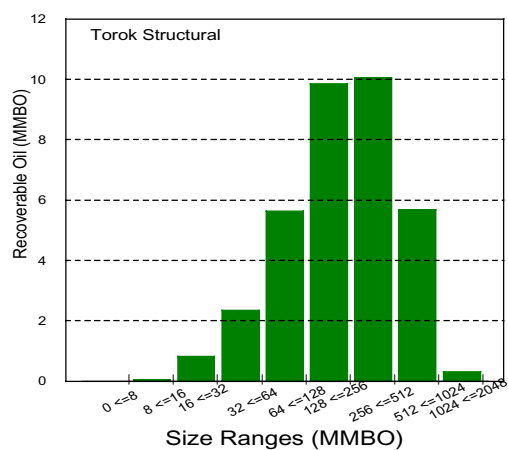
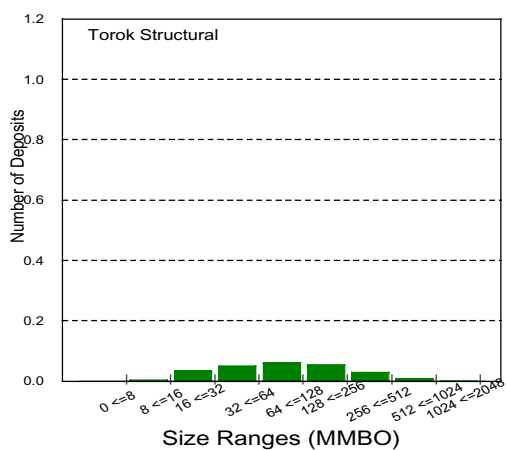


Table 22a: Input values for oil accumulations in the Ellesmerian Structural Play

NPRA Assessment Form-2001

PLAY:	Ellesmerian Structural
Play area:	10 ³ Acres

OIL ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		LTP	0.50	0.05	Max	

NET RESERVOIR THICKNESS¹AREA OF CLOSURE²POROSITY^{3,4}TRAP FILL³

HYDROCARBON PORE VOL ^{3,4}	0	0	0	0
Approx mm bbl (fvf=1)	0.0	0.0	0.0	0.0

Enter POR*Sw

1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

TRAP DEPTH (in 1000 ft) (from sea level)	Surface to sea level correction (1000 ft):
---	--

OIL ACCUMULATION CHARACTERISTICS

Oil recovery factor %

deep

Type of reservoir-drive (check any that apply):

Water:

Depletion:

Gas expansion:

FVF (Formation volume factor, rb/stb):

#NUM! (at median depth)

FVF=0.972+0.000147*F^{1.175}

Pressure(psi)	0
temp(deg F)	30
SolGasGr	#NUM!
F	#NUM!

P=TD*0.5*1000

TD=trap depth (thous ft), P=pressure (psi)

T=19*TD+30

T=temp deg F

LN is log base e

SGG=((0.1402*LN(C27+14.7)-0.4227)+(0.1369*LN(C28)+0.0156)+(0.1704*LN(E37 AG=API gravity

Uncorrected GOR=SGG*((P+14.7)*10^(0.0125*AG))/(18*10^(0.00091*T)))^(1/0.83)

F= Final GOR*(SGG/OG)^0.5+1.25*T

OG=141.5/(131.5+AG)

GOR (Associated gas to oil ratio, cu.ft./bbl, at stp):

#NUM!

#NUM!

NGLR (Natural gas liquids to associated gas ratio, bbls/million cu.ft., at stp):

NGLR=1e+06/(5.36E+05 * exp(-0.254 * Depth(1000 ft)))

Oil quality parameters:

API gravity

Sulfur content of oil

Associated gas quality parameters:

Hydrogen sulfide %

CO2 contamination %

Other inert gases:

Name:

Percent:

Name:

Percent:

TIME OF TRAP DEVELOPMENT

BEGIN

PEAK

END

STRATIGRAPHIC COMPONENT (Ma)

STRUCTURAL COMPONENT (Ma)

Assessor's Name:

C. Potter

Date of Data Entry MM/DD/YYYY:

11/26/01

Date of Simulation Run MM/DD/YYYY:

Note: only enter play name and assessor's name on Oil worksheet

Table 22b: Input values for nonassociated gas accumulations in the Ellesmerian Structural Play
NPRA Assessment Form-2001

PLAY: **Ellesmerian Structural**

Play area: 8125 10³ Acres

NONASSOCIATED GAS ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵		
		LTP	50	5	Max			
NET RESERVOIR THICKNESS ¹	2	40	100	200	600	3	-0.8	Corr(NRT,HPV)
AREA OF CLOSURE ²	1	2.0	4.0	20.0	115.0	1	0.3	Corr(NRT,AC)
POROSITY ^{3,4}	2	4	6	10	12	3		
TRAP FILL ³	4	20	40	80	100	3	POR*Sw	
HYDROCARBON PORE VOL ^{3,4}	2	1	3	7	9		3	
Approx in place bcf		0.01	0.21	9.76	270.51			
Recov bcf at surface		1.3	38.4	1789.9	49622.3			

1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

TRAP DEPTH (in 1000 ft) (from sea level)	4	15	21	25	26	1
	Surface to sea level correction (1000 ft):				1.065	

NONASSOCIATED GAS ACCUMULATION CHARACTERISTICS

NA Gas recovery factor %

Type of reservoir-drive (check any that apply):

Water:

Gas expansion:

Natural gas liquids plus condensate to non-associated gas (bbls/million cf) (in place):

NGL-NAG=1.785*TD (at median)

Non-associated gas quality parameters:

Hydrogen sulfide %

CO2 contamination %

Other inert gases:

Name:

Percent:

Name:

Percent:

Gas fvf

(at median depth)

Gas fvf= $752.2 \cdot (1 - \exp(-0.05728 \cdot TD))$

$113.3 + 21.1 \cdot TD - 0.812 \cdot TD^2 + 0.0116 \cdot TD^3$

TD=trap depth (thous ft)

TD<=5.67 thous ft

5.67<TD<=30

TIME OF TRAP DEVELOPMENT

STRATIGRAPHIC COMPONENT (Ma)

STRUCTURAL COMPONENT (Ma)

BEGIN	PEAK	END
360		170
70	60	45

Assessor's Name:

C. Potter

Date of Data Entry MM/DD/YYYY:

11/26/01

Date of Simulation Run MM/DD/YYYY:

2/12/02

Table 22c:Input risking values for the Ellesmerian Structural Play

Play: **Ellesmerian Structural**

RISKING

MINIMUM ACCUMULATION SIZE, MAS (recov bcf)

250

PRERISKED FREQUENCY DISTRIBUTION (Oil plus Gas)

NUM OF PROSPECTS > MINIMUM SIZE		PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵	
		Est Shape	Min	50	5		Max
		2	25	35	45	60	2

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

ATTRIBUTES

PLAY CHARGE (C)
ATTRIBUTES TRAP (T)
TIMING (F)

Probability that play contains at least 1 reservoir >= minimum size (CxTxF)

PROBABILITY OF FAVORABLE

Computed

1
0.8
1

0.8

PROSPECT CHARGE (c)
ATTRIBUTES TRAP (t)
TIMING (f)

Probability that a randomly chosen prospect is favorable (cxtxf)

0.9
0.1
0.9

0.081

Play Attributes x Prospect Attributes (CxTxFxcxtxf)

0.0648

FRACTION OF ACCUMULATIONS BEING OIL

Fraction NA Gas=1-Fraction(Oil)

0

1

Allocation (percent):

	Land	Oil	Gas
Federal	99		99
State	0		0
Native	1		1

Assessor's Name:

C. Potter

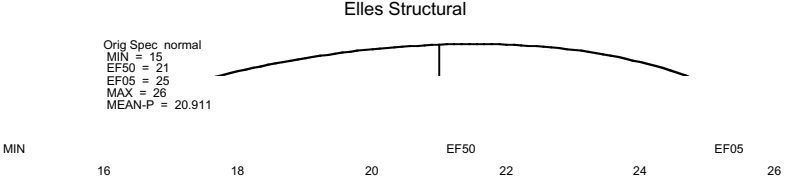
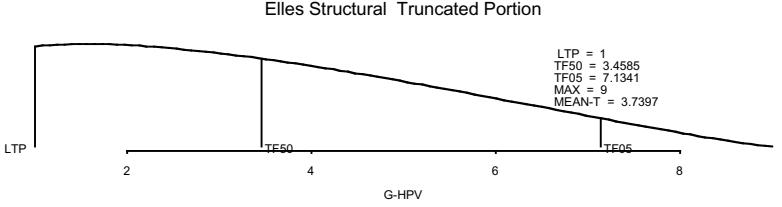
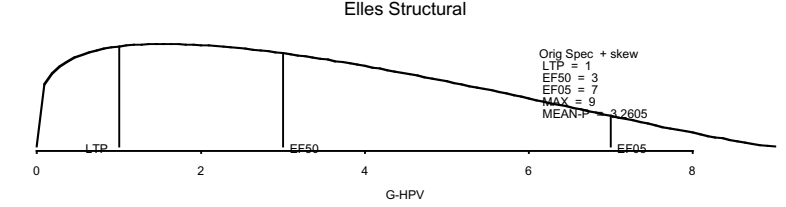
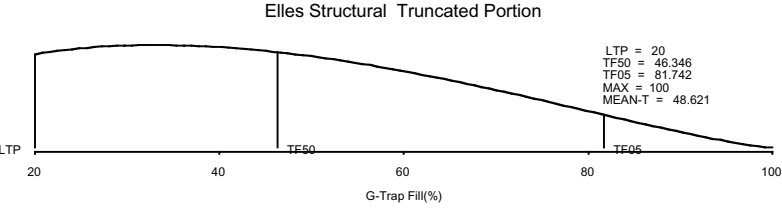
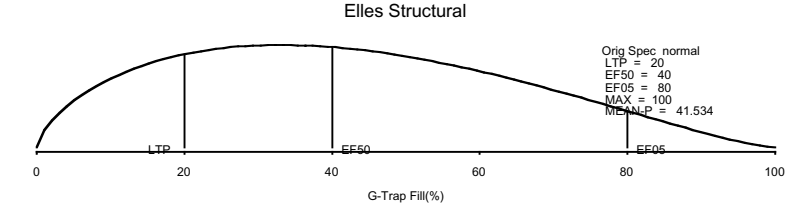
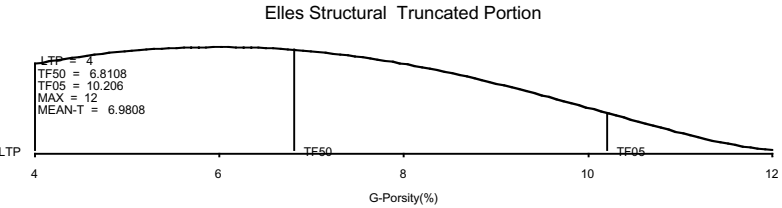
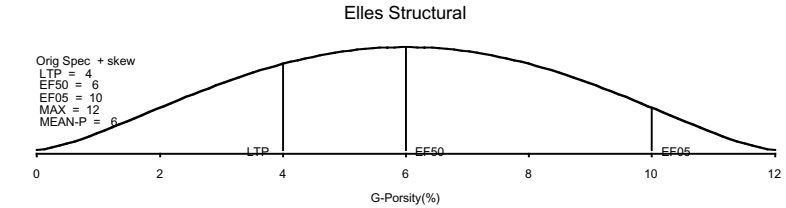
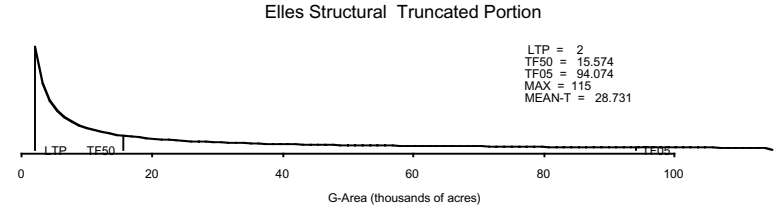
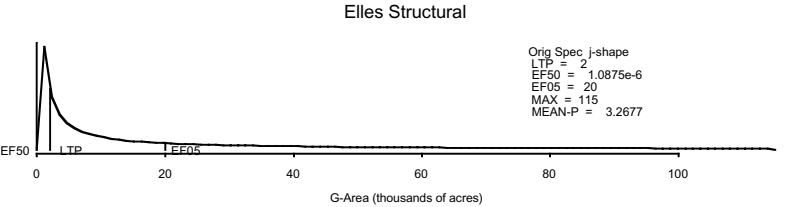
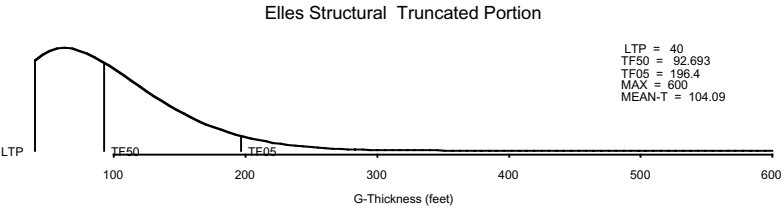
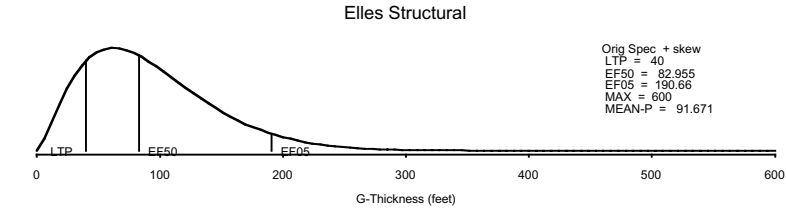
Date of Data Entry MM/DD/YYYY:

11/26/01

Date of Simulation Run MM/DD/YYYY:

2/12/02

Table 22d: Distribution of fitted hydrocarbon volume attributes, trap depth, and number of prospects for the Ellesmerian Structural Play



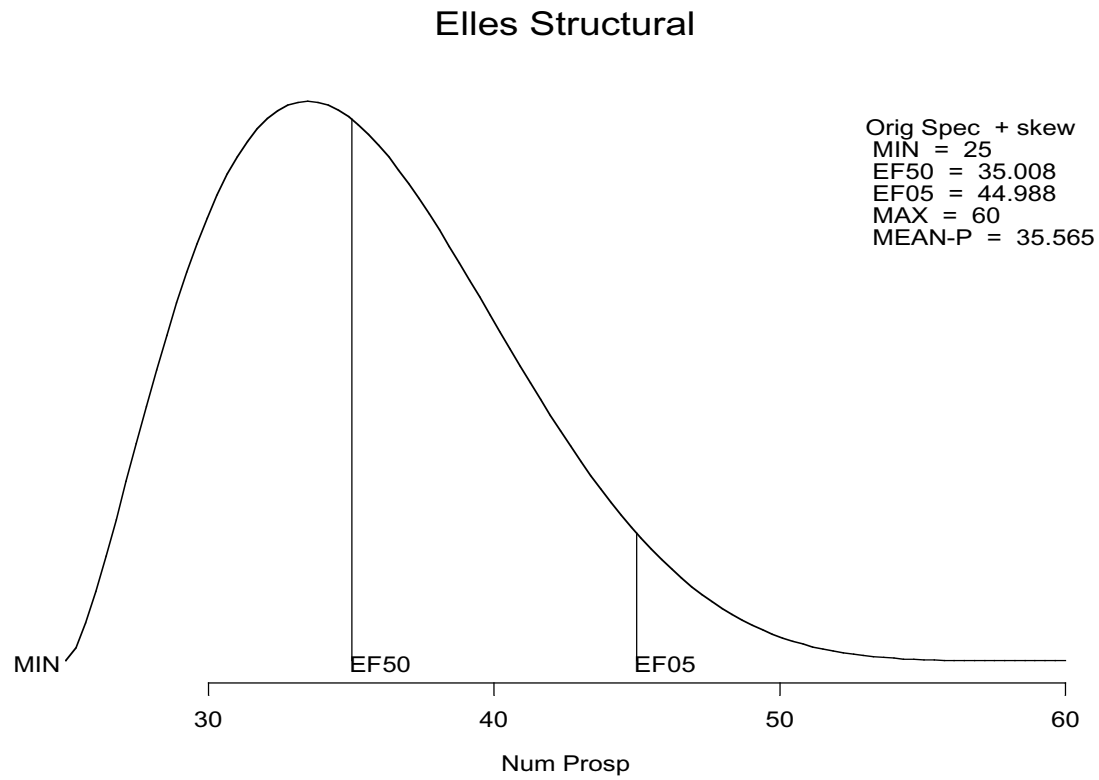
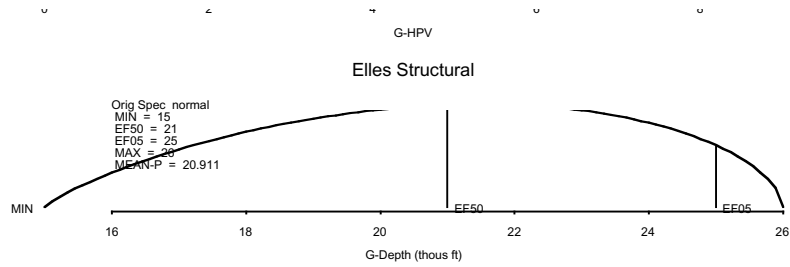
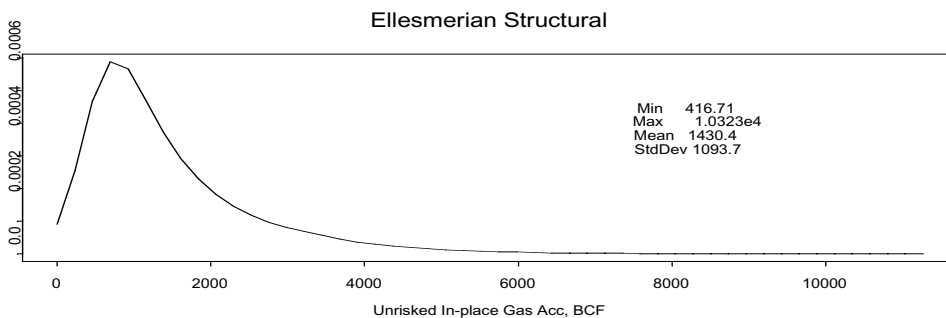


Table 22e: Estimated undiscovered oil and gas resources for the Ellesmerian Structural Play
Deposits



Play Stats

Resource	Unit	Mean	StdDev	F95	F50	F05
In-place oil	MMBO					
In-place NA gas	BCFG	3316.90	3200.49	0.00	2687.95	9457.68
Recov oil	MMBO					
Recov assoc diss gas	BCFG					
Recov NA gas	BCFG	1990.14	1920.29	0.00	1612.77	5674.61
Recov NGL (ADG)	MMBO					
Recov NGL (NAG)	MMBO	78.18	75.93	0.00	63.22	225.50
Num oil deposits						
Num NA gas deposits		2.32	1.91	0.00	2.00	6.00

Random number seed = 99

Play Totals Ellesmerian Structural

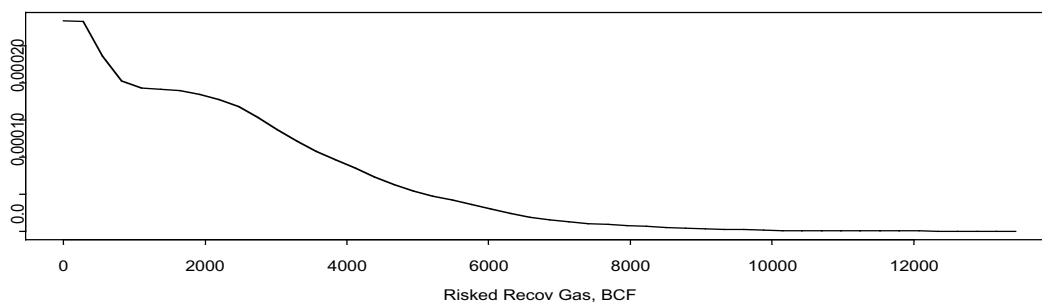


Table 22f: Estimated undiscovered oil and gas resources for the Ellesmerian Structural Play showing number of deposits and volumes by accumulation size class

Start size class	Oil deposits	Oil (MMBO_	Start size c	Gas deposits	NA Gas (BCFG)
0			0	0.00	0.00
8			48	0.00	0.00
16			96	0.00	0.00
32			192	0.54	167.02
64			384	0.83	460.90
128			768	0.65	693.92
256			1536	0.27	550.70
512			3072	0.03	117.27
1024			6144	0.00	0.50
Totals	0.00	0.00		2.32	1990.30

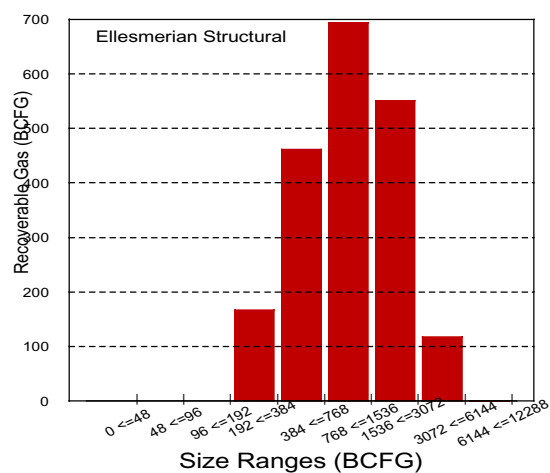
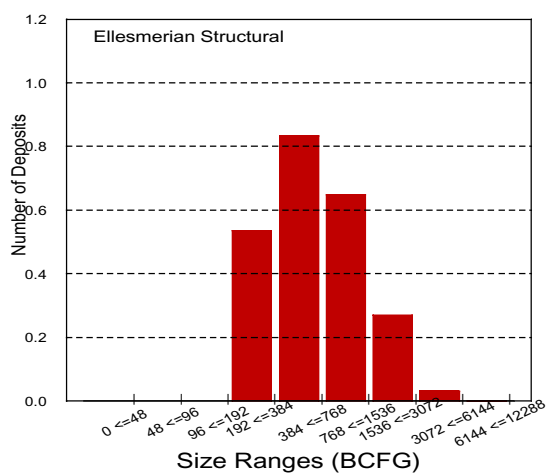


Table 23a: Input values for oil accumulations in the Ellesmerian Thrust Belt Play

NPRA Assessment Form-2001

PLAY:	Ellesmerian Thrust Belt
Play area:	2579 10 ³ Acres

OIL ACCUMULATION VOLUME PARAMETERS

a few large vs many small

Dep NRT Por = -0.5

ATTRIBUTES	Est Shape (1 to 6)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵		
		LTP	50	5	Max			
NET RESERVOIR THICKNESS ¹	2	40	100	350	700	2	-0.5	Corr(NRT,HPV)
AREA OF CLOSURE ²	2	1	4	10	12	2	0.5	Corr(NRT,AC)
POROSITY ^{3,4}	1	4	5	8	13	2		
TRAP FILL ³	4	30	40	80	100	3		Enter POR*Sw
HYDROCARBON PORE VOL ^{3,4}	4	3	4	7	12			1
Approx mm bbl (fvf=1)		2.8	43.4	1520.6	7820.1			
Recov mm bbl at surface		0.7	10.6	371.0	1907.8			

1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

TRAP DEPTH (in 1000 ft) (from sea level)	2	1	5	9	10	1
Surface to sea level correction (1000 ft):					2.228	

OIL ACCUMULATION CHARACTERISTICS

Oil recovery factor %

Type of reservoir-drive (check any that apply):
 Water: Depletion: x Gas expansion:

FVF (Formation volume factor, rb/stb): (at median depth) FVF=0.972+0.000147*F^{1.175}

Pressure(psi)	2500	P=TD*0.5*1000	TD=trap depth (thous ft), P=pressure (psi)	AG=API gravity
temp(deg F)	125	T=19*TD+30	T=temp deg F	LN is log base e
SolGasGr	0.693	SGG=((0.1402*LN(C27+14.7)-0.4227)+(0.1369*LN(C28)+0.0156)+(0.1704*LN(E37)+0.1469))/3		
F	576	Uncorrected GOR=SGG*((P+14.7)*10 ⁴ *(0.0125*AG)/(18*10 ⁴ *(0.00091*T))) ^{1/0.83}		

F= Final GOR*(SGG/OG)^{0.5+1.25*T} OG=141.5/(131.5+AG)

GOR (Associated gas to oil ratio, cu.ft./bbl, at stp): Final GOR at median depth (median depth)
 Uncorrected GOR

NGLR (Natural gas liquids to associated gas ratio, bbls/million cu.ft., at stp)= 4.5985*exp(.1711*TD)

Oil quality parameters:

API gravity	<input type="text" value="30"/>	Oil Grav (ratio)	<input type="text" value="0.876"/>
Sulfur content of oil	<input type="text" value="1.00%"/>		

Associated gas quality parameters:

Hydrogen sulfide %	<input type="text"/>
CO2 contamination %	<input type="text"/>

Other inert gases:

Name:	<input type="text"/>	Percent:	<input type="text"/>
Name:	<input type="text"/>	Percent:	<input type="text"/>

TIME OF TRAP DEVELOPMENT

	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)	320	318	315
STRUCTURAL COMPONENT (Ma)	120	60	45

Assessor's Name: Date of Data Entry MM/DD/YYYY: Date of Simulation Run MM/DD/YYYY:

Table 23b: Input values for nonassociated gas accumulations in the Ellesmerian Thrust Belt
NPRA Assessment Form-2001
PLAY: Ellesmerian Thrust Belt

NONASSOCIATED GAS ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 6)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵						
		LTP	50	5	Max							
NET RESERVOIR THICKNESS ¹	2	40	150	450	900	2	-0.5	Corr(NRT,HPV)				
AREA OF CLOSURE ²	2	1	4	10	35	2	0.5	Corr(NRT,AC)				
POROSITY ^{3,4}	1	2	5	8	13	2						
TRAP FILL ³	4	40	75	85	100	3	POR'Sw		20	40	80	100
HYDROCARBON PORE VOL ^{3,4}	4	1	4	7	12		1					
Approx in place bcf		0.01	0.69	11.66	164.66							
Recov bcf at surface		1.2	117.8	2003.2	28279.8							
<small>1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0 5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point</small>												
TRAP DEPTH (in 1000 ft)	3	1	15	23	28	1						
(from sea level)	Surface to sea level correction (1000 ft):				2.228							

NONASSOCIATED GAS ACCUMULATION CHARACTERISTICS

NA Gas recovery factor %

Type of reservoir-drive (check any that apply):
Water: Gas expansion:

Natural gas liquids plus condensate to non-associated gas (bbbls/million cf) (in place):
NGL-NAG=1.785*TD (at median)

Non-associated gas quality parameters:
Hydrogen sulfide %
CO2 contamination %
Other inert gases:
Name: Percent:
Name: Percent:

Gas fvf Gas fvf= $752.2 \cdot (1 - \exp(-0.05728 \cdot TD))$ TD<=5.67 thous ft
(at median depth) $113.3 + 21.1 \cdot TD - 0.812 \cdot TD^2 + 0.0116 \cdot TD^3$ 5.67<TD<=30
TD=trap depth (thous ft)

For Nonassociated Gas Accumulation:

TIME OF TRAP DEVELOPMENT ¹	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)			
STRUCTURAL COMPONENT (Ma)			

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY: 12/6/01

Table 23c: Input risking values for the Ellesmerian Thrust Belt Play
NPRA Assessment Form-2001

Play: **Ellesmerian Thrust Belt**

RISKING

MINIMUM ACCUMULATION SIZE, MAS (bcf recov)

250

PRERISKED FREQUENCY DISTRIBUTION (Oil plus Gas)

NUM OF PROSPECTS > MINIMUM SIZE	Est Shape	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
	Min	F50	F05	Max		
	2	20	35	50	80	2

5-Knowledge Level: 1=High, 2=Medium, 3=Low

ATTRIBUTES

PLAY CHARGE (C)
 ATTRIBUTES TRAP/ROCK (T)
 TIMING (F)
Probability that play contains at least 1 reservoir >= minimum size (CxTxF)

PROBABILITY OF FAVORABLE

Computed

1
0.8
0.9

0.72

PROSPECT CHARGE (c)
 ATTRIBUTES TRAP/ROCK (t)
 TIMING (f)
Probability that a randomly chosen prospect is favorable (cxtxf)

Oil
0.40
0.15
0.70

Gas
0.90
0.15
0.90

0.042

0.1215

Play Attributes x Prospect Attributes (CxTxFxcxtxf)

0.030

0.087

FRACTION OF ACCUMULATIONS BEING OIL

Fraction NA Gas=1-Fraction(Oil)

0.1

0.9

Allocation (percent):

	Land	Oil	Gas
Federal	99	99	99
State	0	0	0
Native	1	1	1

Assessor's Name:

Moore/Potter

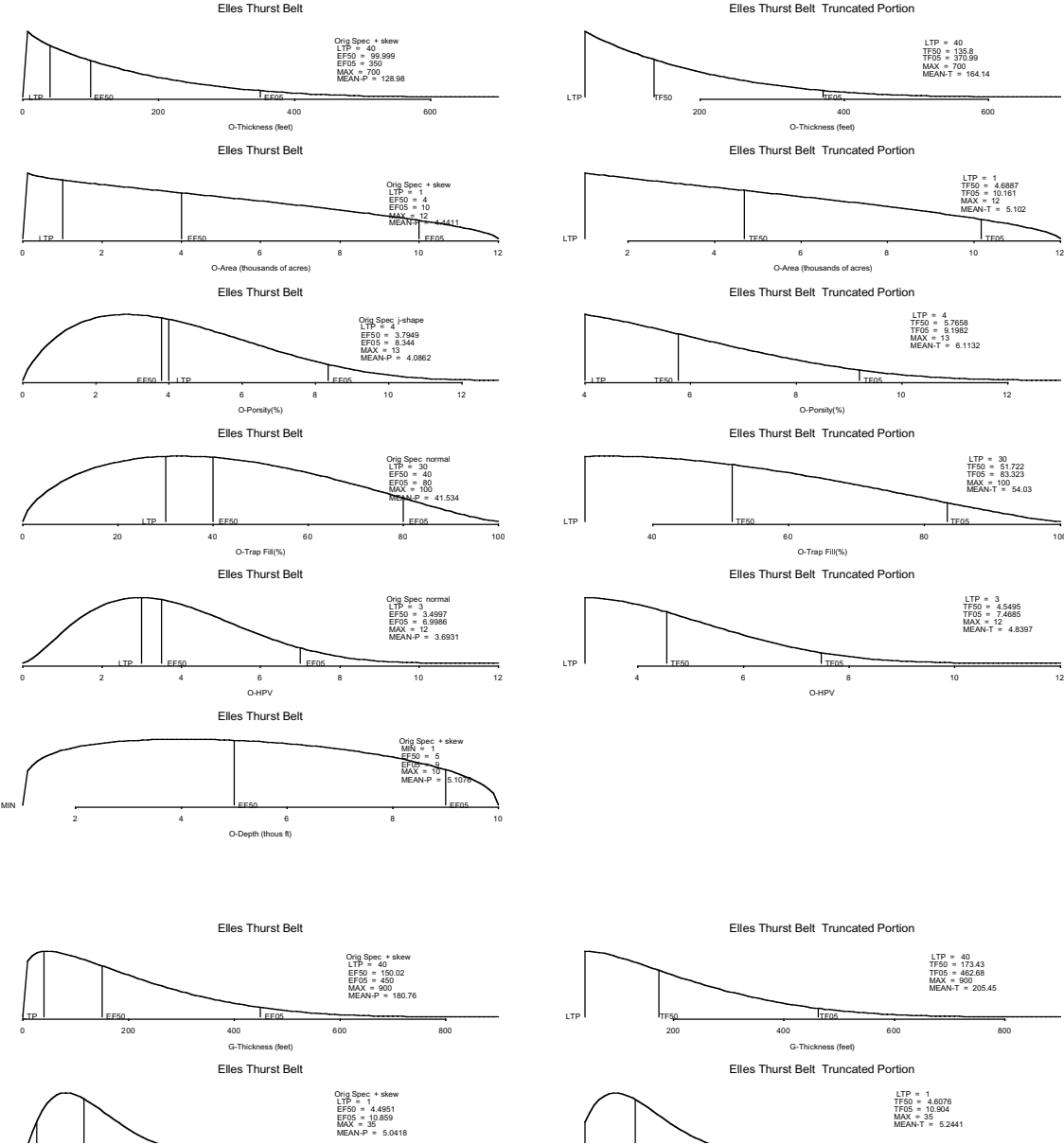
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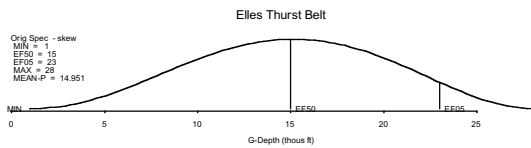
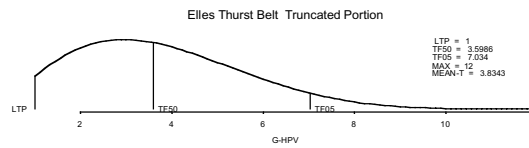
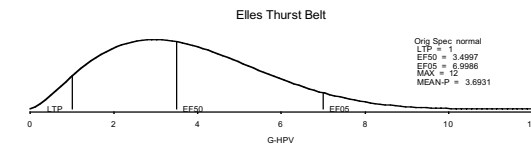
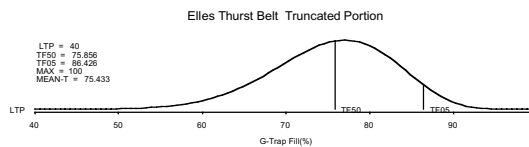
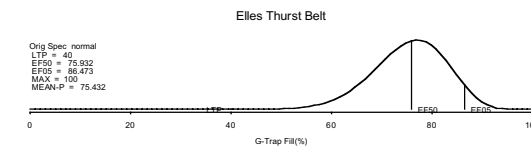
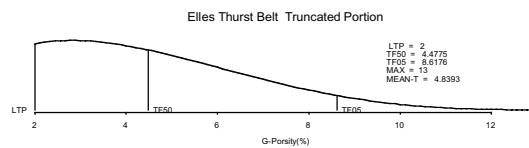
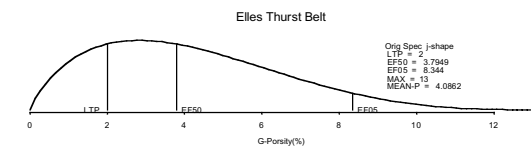
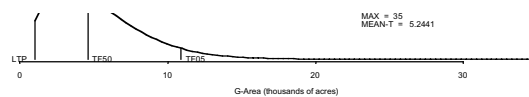
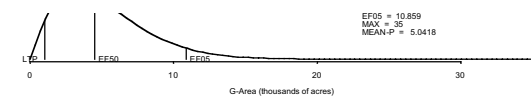
3/20/02

Date of Simulation Run MM/DD/YYYY:

3/20/02

Table 23d: Distribution of fitted hydrocarbon volume attributes, trap depth, and number of prospects for the Ellesmerian Thrust Belt Play





Elles Thurst Belt

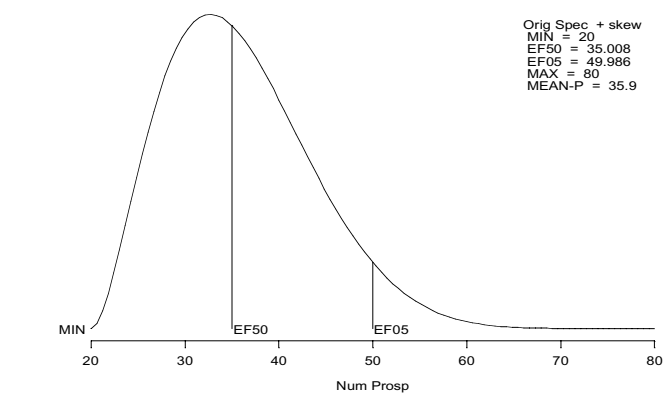
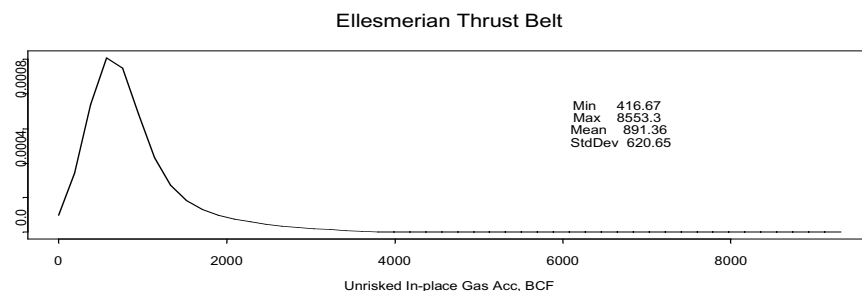
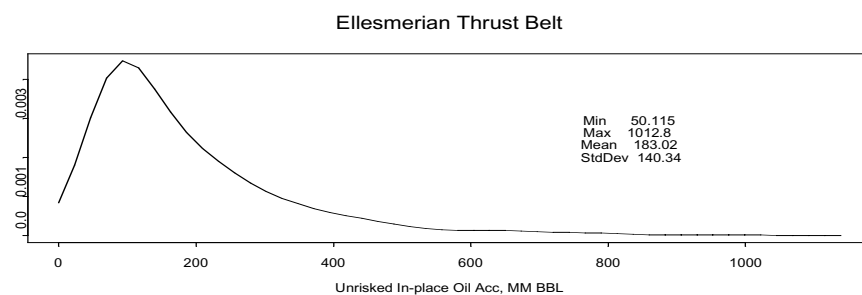


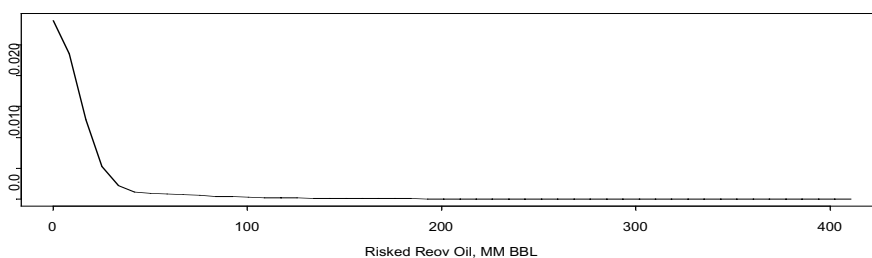
Table 23e: Estimated undiscovered oil and gas resources for the Ellesmerian Thrust Belt Play
Deposit



Play						
Play Stats						
Resource	Unit	Mean	StdDev	F95	F50	F05
In-place oil	MMBO	19.13	75.31	0.00	0.00	142.16
In-place NA gas	BCFG	2534.50	2455.67	0.00	2211.33	7065.88
Recov oil	MMBO	5.74	22.59	0.00	0.00	42.65
Recov assoc diss gas	BCFG	3.98	15.85	0.00	0.00	29.40
Recov NA gas	BCFG	1520.70	1473.40	0.00	1326.80	4239.53
Recov NGL (ADG)	MMBO	0.10	0.42	0.00	0.00	0.73
Recov NGL (NAG)	MMBO	49.28	48.73	0.00	41.93	140.14
Num oil deposits		0.10	0.33	0.00	0.00	1.00
Num NA gas deposits		2.84	2.49	0.00	3.00	7.00

RNS=528

Play Totals Ellesmerian Thrust Belt



Play Totals Ellesmerian Thrust Belt

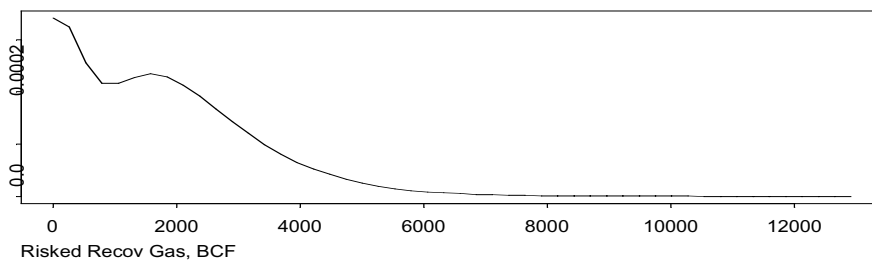


Table 23f: Estimated undiscovered oil and gas resources for the Ellesmerian Thrust Belt showing number of deposits and volumes by accumulation size class

Start size class	Oil deposits	Oil (MMBO)	Start size class	Gas deposits	NA Gas (BCFG)
0	0.00	0.00	0	0.00	0.00
8	0.00	0.05	48	0.00	0.00
16	0.04	0.84	96	0.00	0.00
32	0.03	1.59	192	1.23	379.27
64	0.02	2.06	384	1.16	599.03
128	0.01	1.14	768	0.39	401.79
256	0.00	0.06	1536	0.06	107.61
512			3072	0.01	33.13
Totals	0.10	5.74		2.84	1520.82

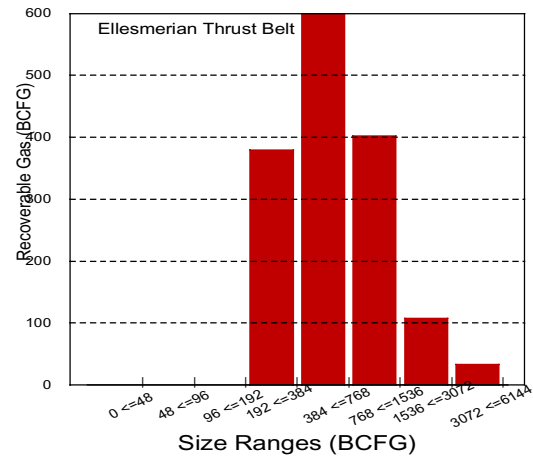
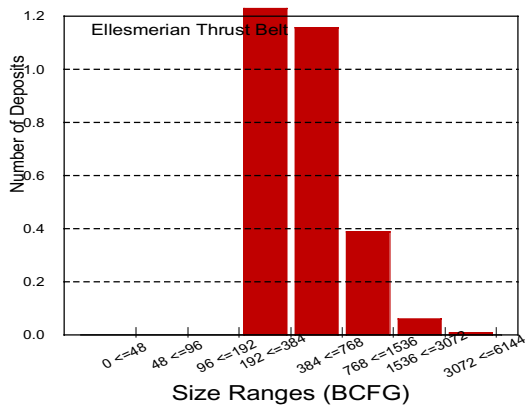
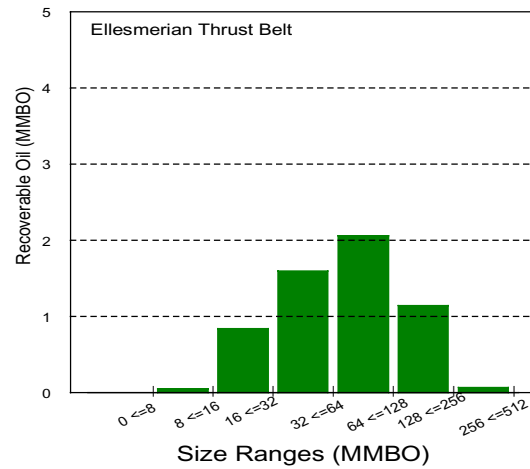
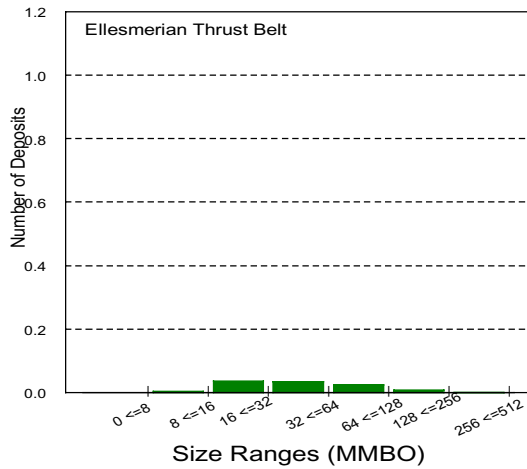


Table 24a: Input values for oil accumulations in the Ellesmerian Ivishak Play

NPRA Assessment Form-2001

PLAY:	Ellesmerian-Ivishak
Play area:	12314 10 ³ Acres

OIL ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵	
		LTP	0.50	0.05	Max		
NET RESERVOIR THICKNESS ¹	2	10	15	45	120	2	0.63
AREA OF CLOSURE ²	2	2.0	4.0	15.0	22.0	2	
POROSITY ^{3,4}	2	9	12	19	22	1	
TRAP FILL ³	6	35	50	80	100	2	Enter POR*Sw
HYDROCARBON PORE VOL ^{3,4}	2	5	8	15	18		4
Approx mm bbl (fvf=1)		2.7	18.6	628.4	3686.6		
Recov mm bbl at surface		0.8	5.4	183.8	1078.4		

1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

TRAP DEPTH (in 1000 ft) (from sea level)	4	6.5	9	13	15	1
	Surface to sea level correction (1000 ft):					0.201

OIL ACCUMULATION CHARACTERISTICS

Oil recovery factor %

Type of reservoir-drive (check any that apply):

Water: Depletion: Gas expansion:

FVF (Formation volume factor, rb/stb): (at median depth) FVF=0.972+0.000147*F^{1.175}

Pressure(psi)	4500	P=TD*0.5*1000	TD=trap depth (thous ft), P=pressure (psi)
temp(deg F)	201	T=19*TD+30	T=temp deg F
SolGasGr	0.727	SGG=((0.1402*LN(C27+14.7)-0.4227)+(0.1369*LN(C28)+0.0156)+(0.1704*LN(E3 AG=API gravity	LN is log base e
F	830	Uncorrected GOR=SGG*((P+14.7)*10 ^{0.0125*AG})/(18*10 ^{0.00091*T})) ^{1/0.83}	

F= Final GOR*(SGG/OG)^{0.5+1.25*T} OG=141.5/(131.5+AG)

GOR (Associated gas to oil ratio, cu.ft./bbl, at stp): Final GOR at median depth

Uncorrected GOR

NGLR (Natural gas liquids to associated gas ratio, bbls/million cu.ft., at stp)= 4.5985*exp(.1711*TD) (median depth)

Oil quality parameters:

API gravity	<input type="text" value="23"/>	Oil Grav (ratio)	<input type="text" value="0.916"/>
Sulfur content of oil	<input type="text" value="1.6"/>		

Associated gas quality parameters:

Hydrogen sulfide %	<input type="text"/>
CO2 contamination %	<input type="text"/>

Other inert gases:

Name:	<input type="text"/>	Percent:	<input type="text"/>
Name:	<input type="text"/>	Percent:	<input type="text"/>

TIME OF TRAP DEVELOPMENT

	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)	240	115	100
STRUCTURAL COMPONENT (Ma)	140	130	100

Assessor's Name:

Date of Data Entry MM/DD/YYYY: 1/2/02 1/3/02

Date of Simulation Run MM/DD/YYYY:

Note: only enter play name and assessor's name on Oil worksheet

Table 24b: Input values for nonassociated gas accumulations in the Ellesmerian Ivishak Play
NPRA Assessment Form-2001
PLAY: **Ellesmerian-Ivishak**

NONASSOCIATED GAS ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵	
		LTP	50	5	Max		
NET RESERVOIR THICKNESS ¹	2	1.0	1.5	4.5	12.0		0.63
AREA OF CLOSURE ²	2	2.0	4.0	15.0	22.0		
POROSITY ^{3,4}	2	9	12	19	22		
TRAP FILL ³	6	35	50	80	100		Uses oil POR*Sw
HYDROCARBON PORE VOL ^{3,4}	2	5	8	15	18		4
Approx in place bcf		0.02	0.10	3.53	20.70		
Recov bcf at surface		2.4	16.7	563.9	3308.3		
1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0							
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point							
TRAP DEPTH (in 1000 ft) (from sea level)	4	6.5	9	13	15	1	
		Surface to sea level correction (1000 ft):			0.201		

NONASSOCIATED GAS ACCUMULATION CHARACTERISTICS

NA Gas recovery factor %

Type of reservoir-drive (check any that apply):
Water: Gas expansion:

Natural gas liquids plus condensate to non-associated gas (bbls/million cf) (in place):
NGL-NAG=1.785*TD (at median)

Non-associated gas quality parameters:
Hydrogen sulfide %
CO2 contamination %
Other inert gases:
Name: Percent:
Name: Percent:

Gas fvf (at median depth) Gas fvf= $752.2 \cdot (1 - \text{EXP}(-0.05728 \cdot \text{TD}))$ TD<=5.67 thous ft
 $113.3 + 21.1 \cdot \text{TD} - 0.812 \cdot \text{TD}^2 + 0.0116 \cdot \text{TD}^3$ 5.67<TD<=30
TD=trap depth (thous ft)

For Nonassociated Gas Accumulation:

TIME OF TRAP DEVELOPMENT ¹	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (M)	240	115	100
STRUCTURAL COMPONENT (Ma)	140	130	100

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Table 24c: Input risking values for the Ellesmerian Ivishak Play
NPRA Assessment Form-2001

Play: **Ellesmerian-Ivishak**

RISKING

MINIMUM ACCUMULATION SIZE, MAS (Millions of BBL in place)

50

PRERISKED FREQUENCY DISTRIBUTION (Oil plus Gas)

NUM OF PROSPECTS > MINIMUM SIZE	Est Shape	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
	Min	50	5	Max		
	2	10	15	18	40	2

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

ATTRIBUTES

PLAY CHARGE (C)
 ATTRIBUTES TRAP (T)
 TIMING (F)

Probability that play contains at least 1 reservoir >= minimum size (CxTxF)

PROBABILITY OF FAVORABLE

Computed

1
0.9
1

0.9

PROSPECT CHARGE (c)
 ATTRIBUTES TRAP (t)
 TIMING (f)

Probability that a randomly chosen prospect is favorable (cxtxf)

0.4
0.4
1

0.16

Play Attributes x Prospect Attributes (CxTxFxcxtxf)

0.144

FRACTION OF ACCUMULATIONS BEING OIL

Fraction NA Gas=1-Fraction(Oil)

0.85

0.15

Allocation (percent):

	Land	Oil	Gas
Federal	91	91	91
State	6	6	6
Native	3	3	3

Assessor's Name:

Ken Bird

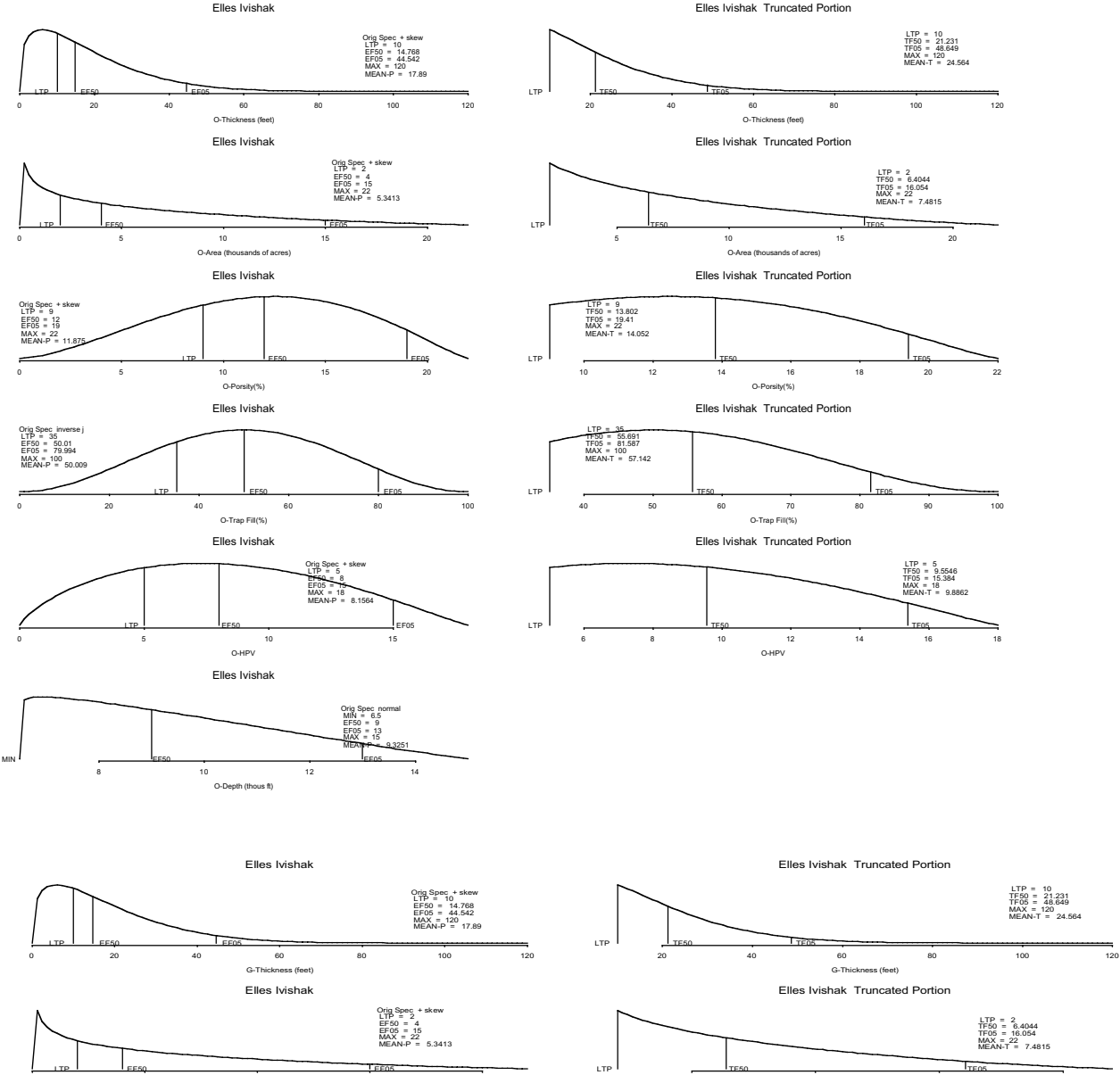
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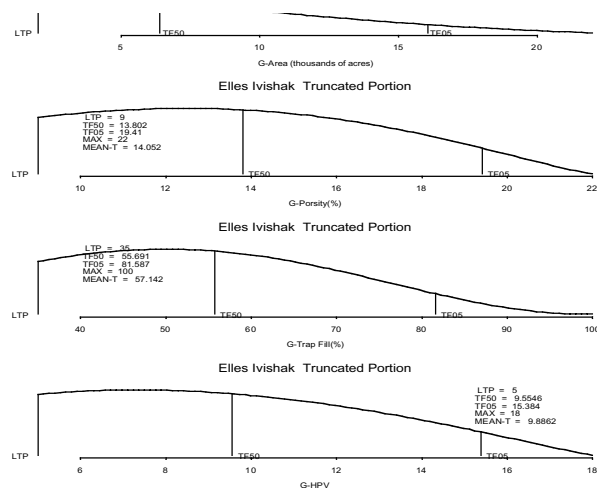
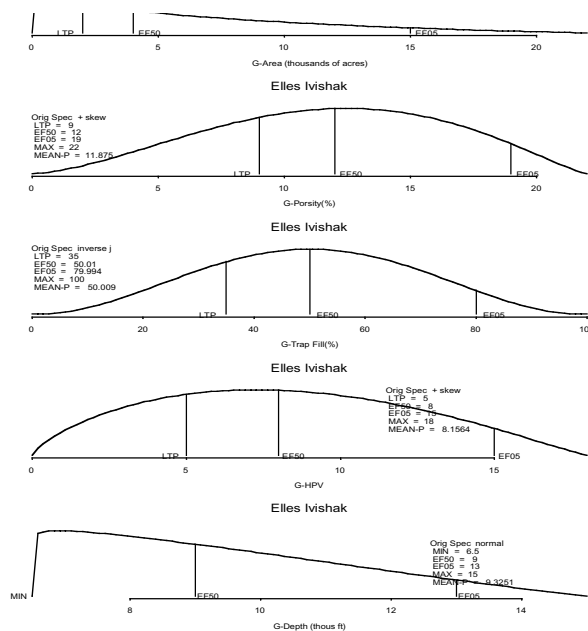
10/24/01

Date of Simulation Run MM/DD/YYYY:

2/6/02

Table 24d: Distribution of fitted hydrocarbon volume attributes, trap depth, and number of prospects for the Ellesmerian Ivishak Play





Elles Ivishak

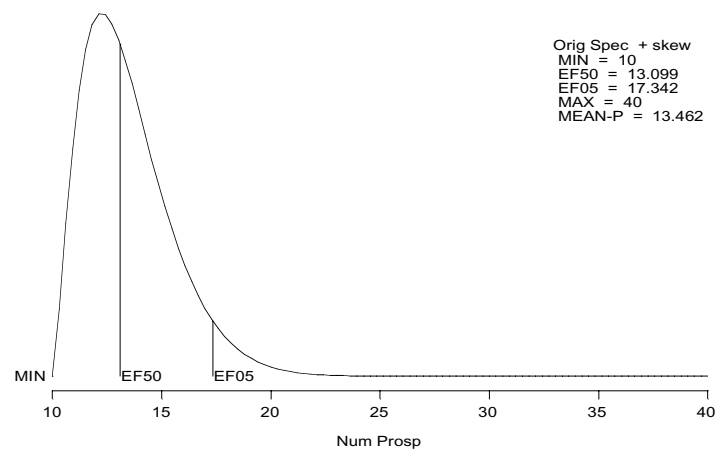
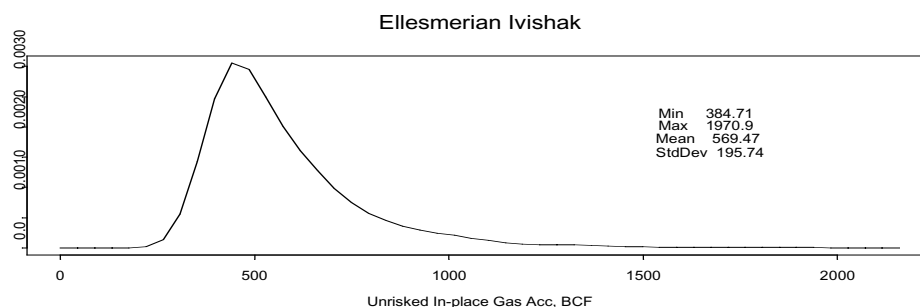
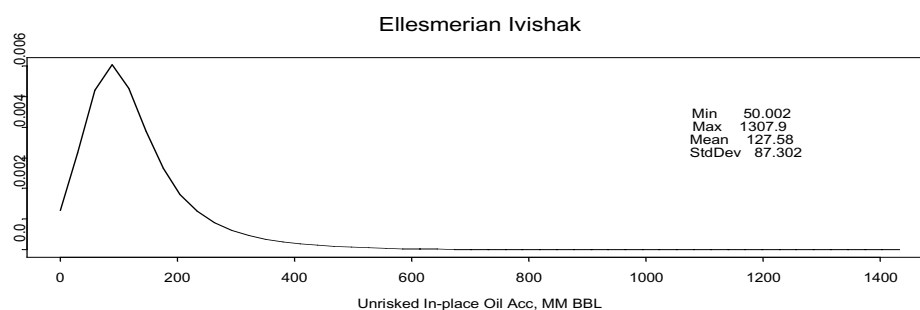


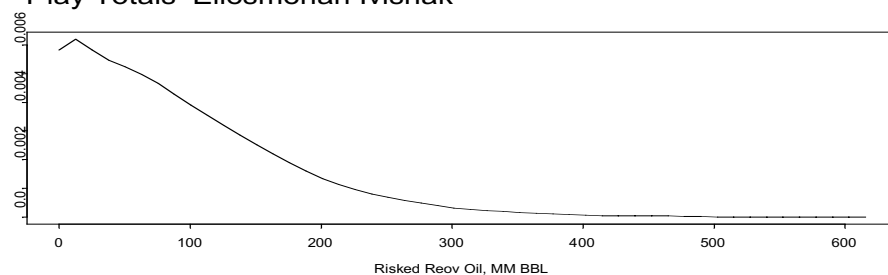
Table 24e: Estimated undiscovered oil and gas resources for Ellesmerian Ivishak Play Deposit



Play Stats						
Resource	Unit	Mean	StdDev	F95	F50	F05
In-place oil	MMBO	210.34	203.20	0.00	165.29	607.56
In-place NA gas	BCFG	162.46	324.93	0.00	0.00	868.62
Recov oil	MMBO	84.14	81.28	0.00	66.12	243.02
Recov assoc diss gas	BCFG	56.00	54.42	0.00	43.54	160.88
Recov NA gas	BCFG	105.60	211.20	0.00	0.00	564.60
Recov NGL (ADG)	MMBO	2.04	2.06	0.00	1.53	6.02
Recov NGL (NAG)	MMBO	1.86	3.82	0.00	0.00	9.88
Num oil deposits		1.65	1.34	0.00	2.00	4.00
Num NA gas deposits		0.29	0.54	0.00	0.00	1.00

RNS=715

Play Totals Ellesmerian Ivishak



Play Totals Ellesmerian Ivishak

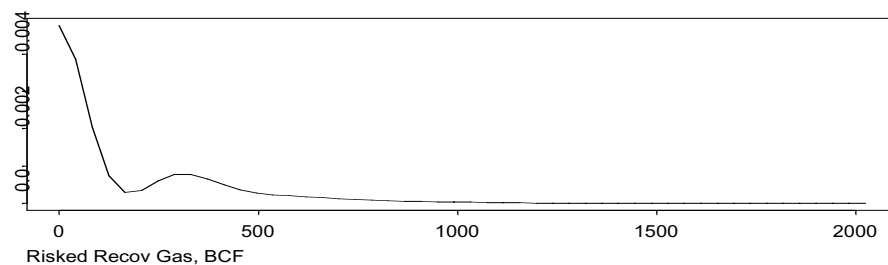


Table 24f: Estimated undiscovered oil and gas resources for the Ellesmerian Ivishak Play showing number of deposits and volumes by accumulation size class

Start size class	Oil deposits	Oil (MMBO_	Start size class	Gas deposits	NA Gas (BCFG)
0	0.00	0.00	0	0.00	0.00
8	0.00	0.00	48	0.00	0.00
16	0.58	14.90	96	0.00	0.00
32	0.68	30.40	192	0.19	58.55
64	0.32	27.38	384	0.09	42.73
128	0.07	10.64	768	0.00	4.33
256	0.00	0.78	1536		
512	0.00	0.05	3072		
Totals	1.65	84.14		0.29	105.61

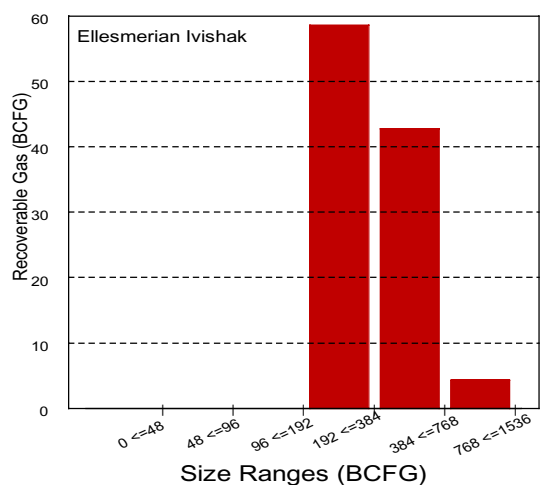
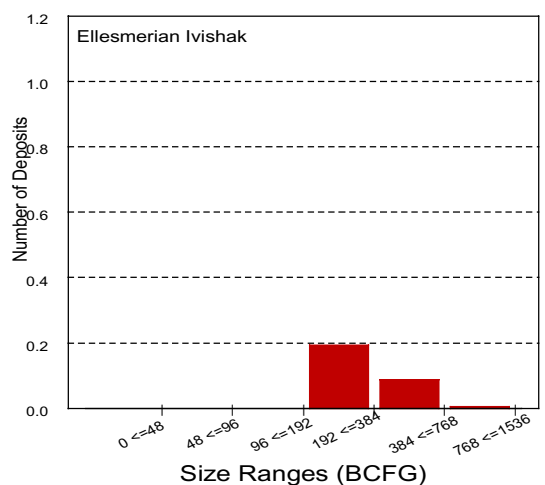
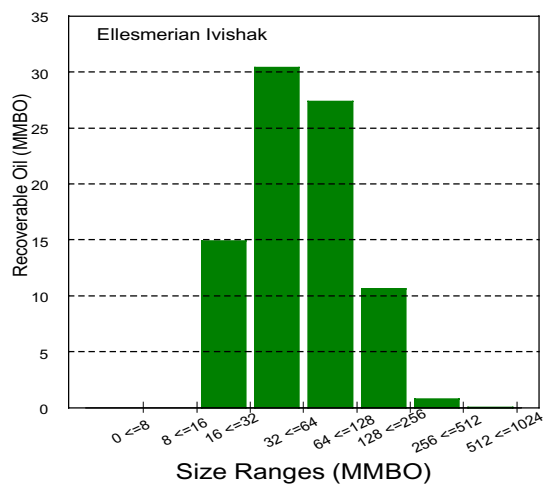
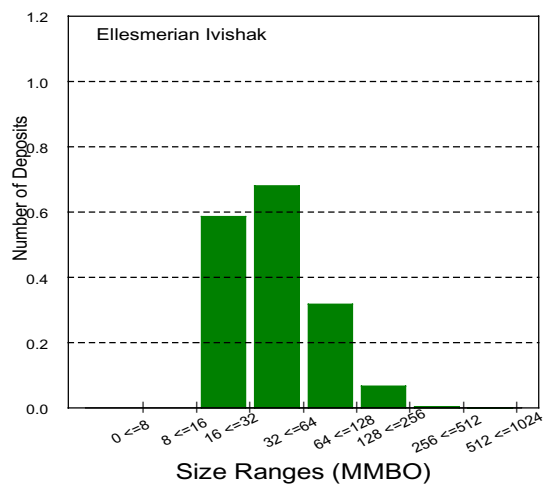


Table 25a. Input values for oil accumulations in the Ellesmerian Echooka North Play.

NPRA Assessment Form-2001

PLAY:	Ellesmerian Echooka North
Play area:	2,858 10 ³ Acres

OIL ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵	
		LTP	0.50	0.05	Max		
NET RESERVOIR THICKNESS ¹	4	30	100	150	200	3	0.57 Corr(nrt,ac)
AREA OF CLOSURE ²	2	3	4	10	20	3	
POROSITY ^{3,4}	4	10	15	20	22	2	
TRAP FILL ³	6	50	80	99	100	3	Enter POR*Sw
HYDROCARBON PORE VOL ^{3,4}	4	7	12	17	19		3
Approx mm bbl (fvf=1)		24.4	297.9	1958.5	5896.1		
Recov mm bbl at surface		7.1	86.2	567.0	1706.9		

1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

TRAP DEPTH (in 1000 ft)	2	8	9	11	14	1
(from sea level)	Surface to sea level correction (1000 ft):					0.095

OIL ACCUMULATION CHARACTERISTICS

Oil recovery factor %

Type of reservoir-drive (check any that apply):

Water: Depletion: Gas expansion:

FVF (Formation volume factor, rb/stb): (at median depth) FVF=0.972+0.000147*F^{1.175}

Pressure(psi)	4500	P=TD*0.5*1000	TD=trap depth (thous ft), P=pressure (psi)
temp(deg F)	201	T=19*TD+30	T=temp deg F LN is log base e
SolGasGr	0.729	SGG=((0.1402*LN(C27+14.7)-0.4227)+(0.1369*LN(C28)+0.0156)+(0.1704*LN(E3 AG=API gravity	
F	855	Uncorrected GOR=SGG*((P+14.7)*10^(0.0125*AG))/(18*10^(0.00091*T)))^(1/0.83)	

F= Final GOR*(SGG/OG)^0.5+1.25*T OG=141.5/(131.5+AG)

GOR (Associated gas to oil ratio, cu.ft./bbl, at stp): Final GOR at median depth

Uncorrected GOR

NGLR (Natural gas liquids to associated gas ratio, bbls/million cu.ft., at stp)= 4.5985*exp(.1711*TD) (median depth)

Oil quality parameters: Source: Lisburne

API gravity	24	Oil Grav (ratio)	0.910
Sulfur content of oil	1.6		

Associated gas quality parameters:

Hydrogen sulfide %	2
CO2 contamination %	8

Other inert gases:

Name:		Percent:	
Name:		Percent:	

TIME OF TRAP DEVELOPMENT

	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)	248	245	100
STRUCTURAL COMPONENT (Ma)	140	130	100

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Note: only enter play name and assessor's name on Oil worksheet

Table 25b. Input values for nonassociated gas accumulations in the Ellesmerian Echooka North Play.

NPRA Assessment Form-2001

PLAY: **Ellesmerian Echooka North**

NONASSOCIATED GAS ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵	
		LTP	50	5	Max		
NET RESERVOIR THICKNESS ¹	4	30	100	150	200	3	0.57
AREA OF CLOSURE ²	2	3	4	10	20	3	
POROSITY ^{3,4}	4	10	15	20	22	2	
TRAP FILL ³	6	50	80	99	100	3	Uses oil POR*Sw
HYDROCARBON PORE VOL ^{3,4}	4	7	12	17	19		3
Approx in place bcf		0.14	1.67	11.00	33.11		
Recov bcf at surface		21.9	267.3	1757.5	5291.1		
1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0							
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point							
TRAP DEPTH (in 1000 ft)	2	8	9	11	14	3	
(from sea level)	Surface to sea level correction (1000 ft):				0.095		

NONASSOCIATED GAS ACCUMULATION CHARACTERISTICS

NA Gas recovery factor %

Type of reservoir-drive (check any that apply):
 Water: Gas expansion:

Natural gas liquids plus condensate to non-associated gas (bbls/million cf) (in place):
 NGL-NAG=1.785*TD (at median)

Non-associated gas quality parameters:
 Hydrogen sulfide %
 CO2 contamination %
 Other inert gases:
 Name: Percent:
 Name: Percent:

Gas fvf Gas fvf= $752.2 \cdot (1 - \text{EXP}(-0.05728 \cdot \text{TD}))$ TD<=5.67 thous ft
 (at median depth) $113.3 + 21.1 \cdot \text{TD} - 0.812 \cdot \text{TD}^2 + 0.0116 \cdot \text{TD}^3$ 5.67<TD<=30
 TD=trap depth (thous ft)

TIME OF TRAP DEVELOPMENT	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (M)	248	245	100
STRUCTURAL COMPONENT (Ma)	140	130	100

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Table 25c. Input risking values for the Ellesmerian Echooka North Play.

NPRA Assessment Form-2001

Play: **Ellesmerian Echooka North**

RISKING

MINIMUM ACCUMULATION SIZE, MAS (Millions of BBL in place)

50

PRERISKED FREQUENCY DISTRIBUTION (Oil plus Gas)

NUM OF PROSPECTS > MINIMUM SIZE	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
	Est Shape	LTP	5 0	5	Max
	2	2	4	6	2 0
					3

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

ATTRIBUTES

**PROBABILITY
OF FAVORABLE**

Computed

PLAY CHARGE (C)
ATTRIBUTES TRAP (T)
TIMING (F)

0.5
0.4
1

Probability that play contains at least 1 reservoir >= minimum size (CxTxF)

0.2

PROSPECT CHARGE (c)
ATTRIBUTES TRAP (t)
TIMING (f)

0.3
0.3
1

Probability that a randomly chosen prospect is favorable (cxtxf)

0.09

Play Attributes x Prospect Attributes (CxTxFxcxtxf)

0.018

FRACTION OF ACCUMULATIONS BEING OIL

0.8

Fraction NA Gas=1-Fraction(Oil)

0.2

Allocation (percent):

	Land	Oil	Gas
Federal	84	84	84
State	12	12	12
Native	4	4	4

Assessor's Name:

Ken Bird & Phil Nelson

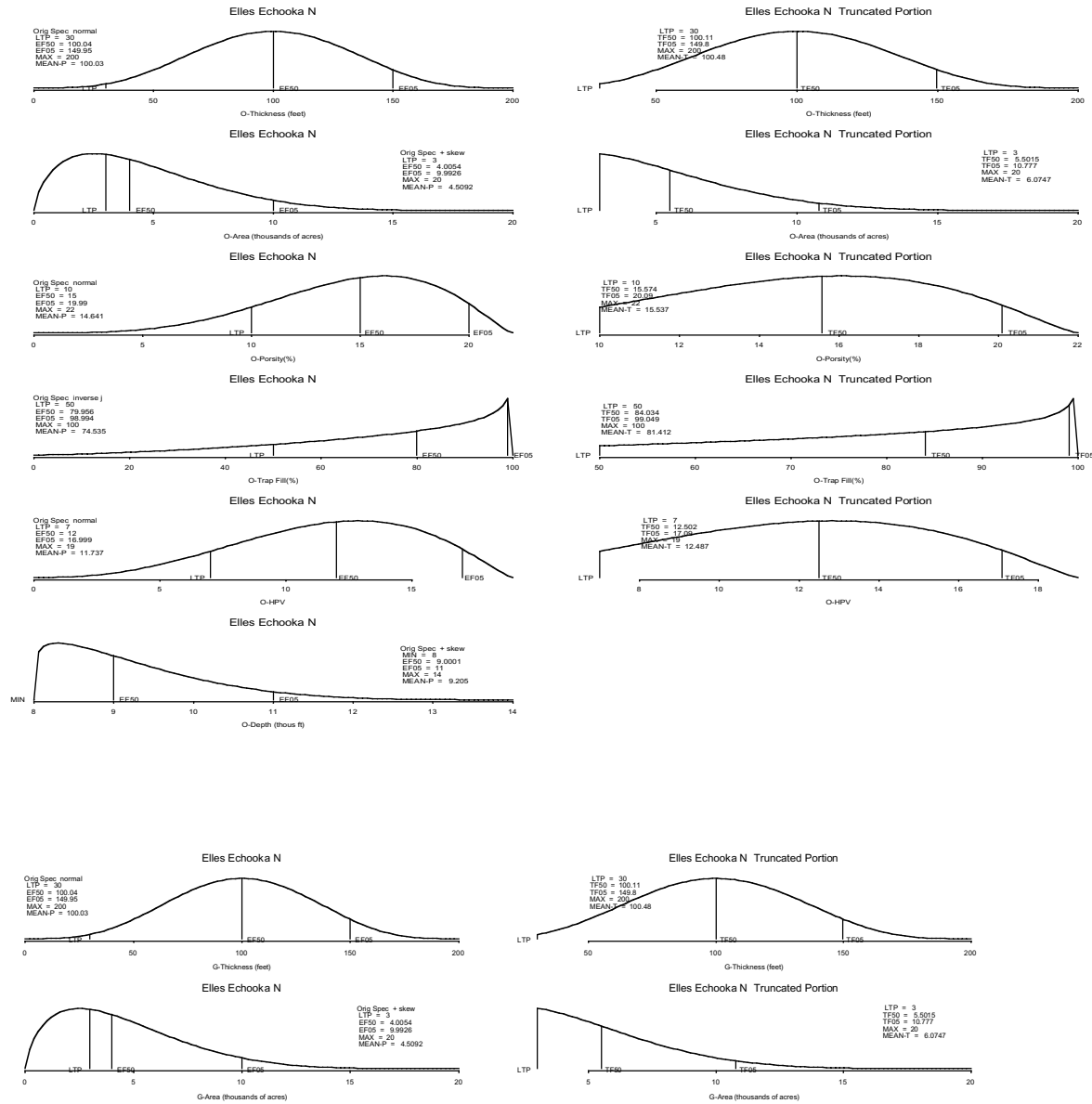
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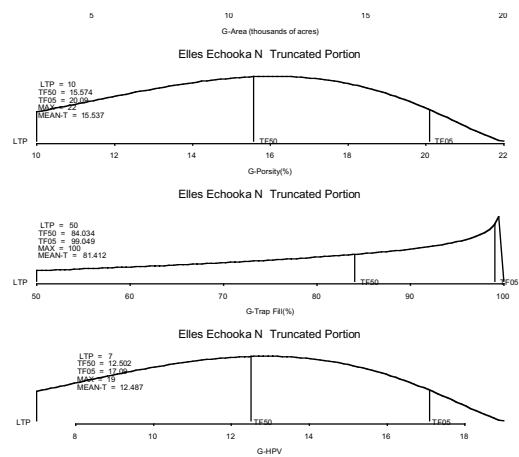
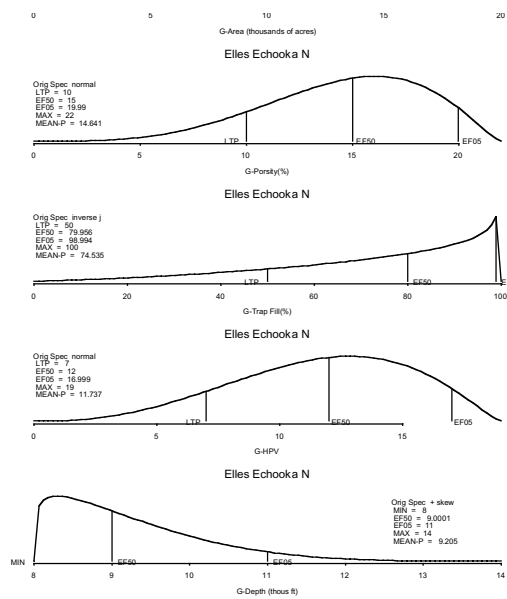
10/23/01

Date of Simulation Run MM/DD/YYYY:

2/6/02

Table 25d. Distribution of fitted hydrocarbon volume attributes, trap depth, and number of prospects for the Ellesmerian Echooka North Play.





Elles Echooka N

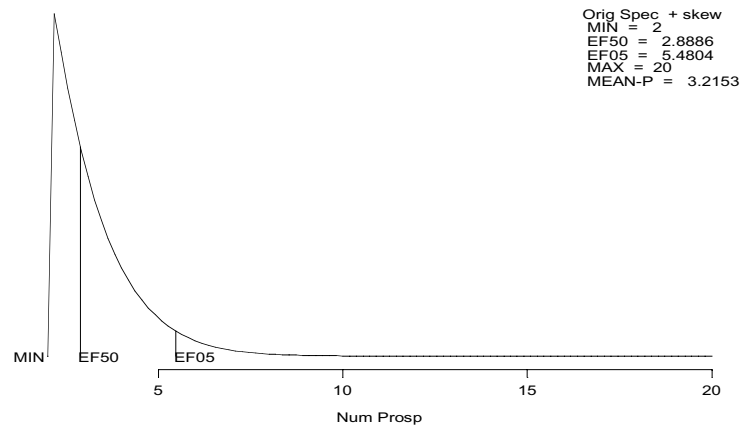
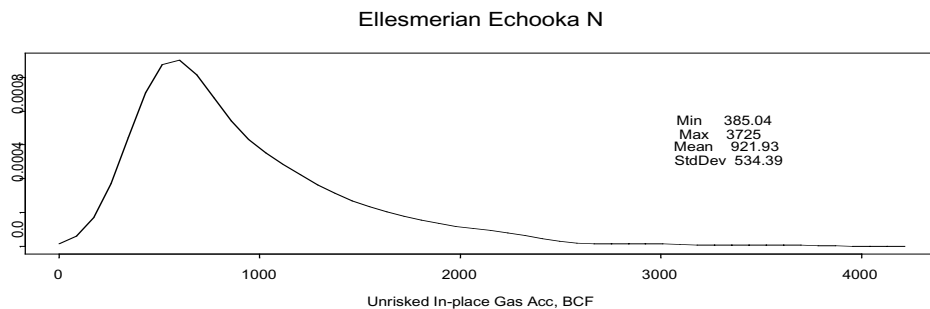
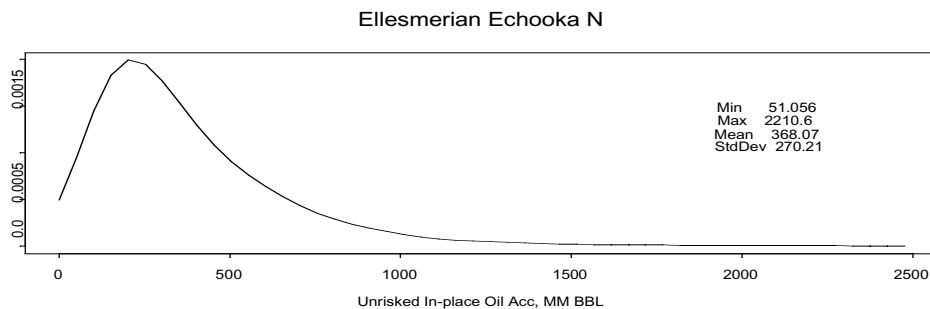


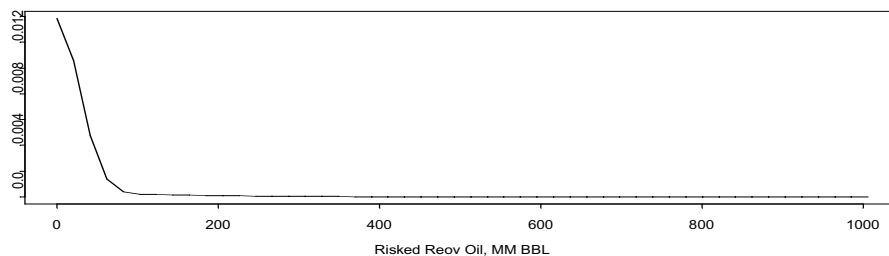
Table 25e. Estimated undiscovered oil and gas resources for the Ellesmerian Echooka North Play.



Play Stats						
Resource	Unit	Mean	StdDev	F95	F50	F05
In-place oil	MMBO	17.23	103.31	0.00	0.00	0.00
In-place NA gas	BCFG	11.16	119.70	0.00	0.00	0.00
Recov oil	MMBO	6.89	41.33	0.00	0.00	0.00
Recov assoc diss gas	BCFG	4.77	28.68	0.00	0.00	0.00
Recov NA gas	BCFG	7.25	77.81	0.00	0.00	0.00
Recov NGL (ADG)	MMBO	0.16	0.95	0.00	0.00	0.00
Recov NGL (NAG)	MMBO	0.12	1.31	0.00	0.00	0.00
Num oil deposits		0.05	0.23	0.00	0.00	0.00
Num NA gas deposits		0.01	0.11	0.00	0.00	0.00

RNS=667

Play Totals Ellesmerian Echooka N



Play Totals Ellesmerian Echooka N

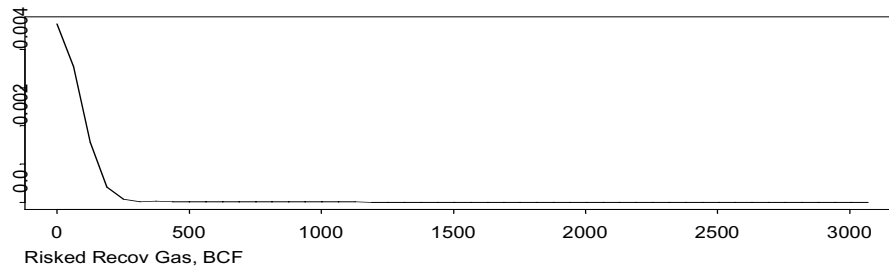


Table 25f. Estimated undiscovered oil and gas resources for the Ellesmerian Echooka North Play showing number of deposits and volumes by accumulation size class.

Start size class	Oil deposits	Oil (MMBO)	Start size class	Gas deposits	Gas (BCFG)
0	0.00	0.00	0	0.00	0.00
8	0.00	0.00	48	0.00	0.00
16	0.00	0.03	96	0.00	0.00
32	0.01	0.41	192	0.00	1.25
64	0.02	1.51	384	0.01	2.86
128	0.01	2.67	768	0.00	2.69
256	0.01	1.92	1536	0.00	0.45
512	0.00	0.36	3072		
Totals	0.05	6.89		0.01	7.25

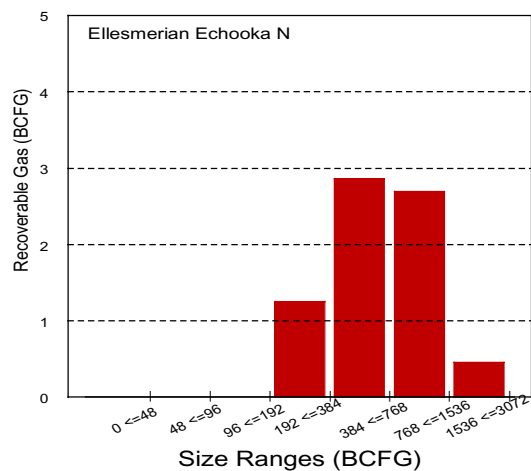
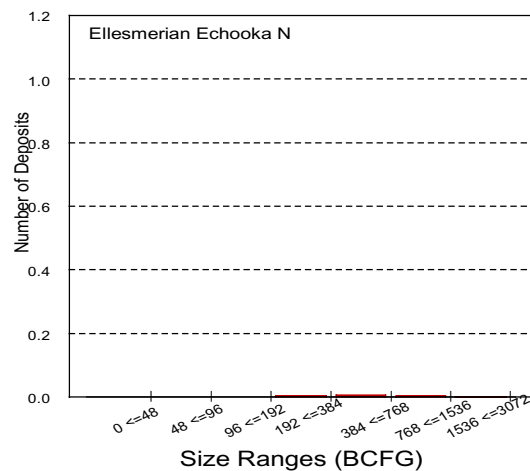
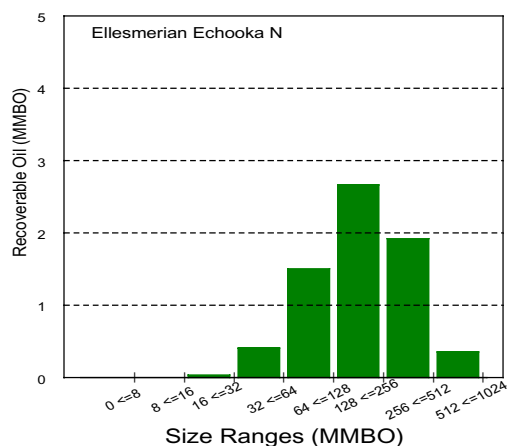
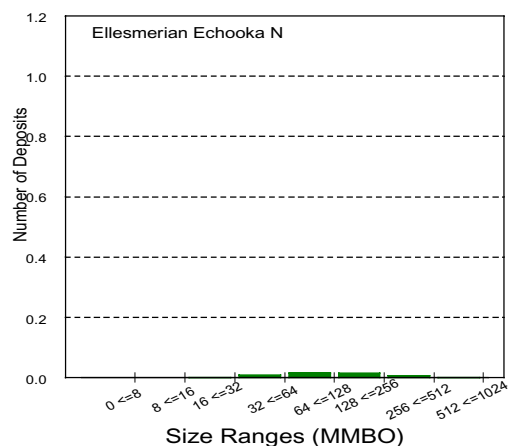


Table 26a: Input values for oil accumulations in the Ellesmerian Echooka South Play
NPRA Assessment Form-2001

PLAY:	Ellesmerian Echooka South
Play area:	7162 10 ³ Acres

OIL ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		LTP	0.50	0.05	Max	
NET RESERVOIR THICKNESS ¹						
AREA OF CLOSURE ²						
POROSITY ^{3,4}						
TRAP FILL ³						
HYDROCARBON PORE VOL. ^{3,4}		0	0	0	0	Enter POR*Sw
Approx mm bbl (fvf=1)		0.0	0.0	0.0	0.0	

1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

TRAP DEPTH (in 1000 ft) (from sea level)	4	8	10	11	15
	Surface to sea level correction (1000 ft):				

OIL ACCUMULATION CHARACTERISTICS

Oil recovery factor %

Type of reservoir-drive (check any that apply):

Water: Depletion: ☒ Gas expansion:

FVF (Formation volume factor, rb/stb):

GOR (Associated gas to oil ratio, cu.ft./bbl, at stp):

NGLR (Natural gas liquids to associated gas ratio, bbls/million cu.ft., at stp):

$$\text{NGLR} = 1\text{e}+06 / (5.36\text{E}+05 * \exp(-0.254 * \text{Depth}(1000 \text{ ft})))$$

Oil quality parameters:

API gravity	
Sulfur content of oil	

Associated gas quality parameters:

Hydrogen sulfide %	
CO2 contamination %	

Other inert gases:

Name:		Percent:	
Name:		Percent:	

TIME OF TRAP DEVELOPMENT

	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)			
STRUCTURAL COMPONENT (Ma)			

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Note: only enter play name and assessor's name on Oil worksheet

Table 26b: Input values for nonassociated gas accumulations in the Ellesmerian Echooka South Play
NPRA Assessment Form-2001

PLAY: **Ellesmerian Echooka South**

Play area: 7162 10³ Acres

NONASSOCIATED GAS ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵	
		LTP	50	5	Max		
NET RESERVOIR THICKNESS ¹	2	25	35	75	200	3	0.62
AREA OF CLOSURE ²	2	1.0	3.0	15.0	30.0	3	
POROSITY ^{3,4}	4	7	10	13	18	3	
TRAP FILL ³	4	40	60	80	100	3	POR*Sw
HYDROCARBON PORE VOL ^{3,4}	4	2	5	8	13		5
Approx in place bcf		0.01	0.14	3.14	33.98		
Recov bcf at surface		1.6	25.5	583.6	6321.8		
1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0							
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point							
TRAP DEPTH (in 1000 ft)	4	11	15	18	25	1	
(from sea level)	Surface to sea level correction (1000 ft):				0.235		

NONASSOCIATED GAS ACCUMULATION CHARACTERISTICS

NA Gas recovery factor % 65

Type of reservoir-drive (check any that apply):

Water: ☐

Gas expansion: ☐

Natural gas liquids plus condensate to non-associated gas (bbls/million cf) (in place):

NGL-NAG=1.785*TD 26.8 (at median)

Non-associated gas quality parameters:

Hydrogen sulfide % 3

CO2 contamination % 10

Other inert gases:

Name:

Percent:

Name:

Percent:

Gas fvf 286.3

Gas fvf= 752.2*(1-EXP(-0.05728*TD))

TD<=5.67 thous ft

(at median depth)

113.3+21.1*TD-0.812*TD^2+0.0116*TD^3

5.67<TD<=30

TD=trap depth (thous ft)

TIME OF TRAP DEVELOPMENT

STRATIGRAPHIC COMPONENT (Ma)

BEGIN

PEAK

END

STRUCTURAL COMPONENT (Ma)

248	245	240
200	130	100

Assessor's Name:

Ken Bird & Phil Nelson

Date of Data Entry MM/DD/YYYY:

10/23/01

1/2/02

Date of Simulation Run MM/DD/YYYY:

2/6/02

Table 26c: Input risking values for the Ellesmerian Echooka South Play
NPRA Assessment Form-2001

Play: **Ellesmerian Echooka South**

RISKING

MINIMUM ACCUMULATION SIZE, MAS (bcf recov)

250

PRERISKED FREQUENCY DISTRIBUTION (Oil plus Gas)

NUM OF PROSPECTS > MINIMUM SIZE	Est Shape	LTP	50	5	Max	Knowledge Level 1-3 ⁵
	2	20	30	65	80	3

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

ATTRIBUTES

PLAY CHARGE (C)
 ATTRIBUTES TRAP (T)
 TIMING (F)

Probability that play contains at least 1 reservoir >= minimum size (CxTxF)

PROBABILITY OF FAVORABLE

Computed

0.8
0.6
1

0.48

PROSPECT CHARGE (c)
 ATTRIBUTES TRAP (t)
 TIMING (f)

Probability that a randomly chosen prospect is favorable (cxtxf)

0.4
0.2
1

0.08

Play Attributes x Prospect Attributes (CxTxFxcxtxf)

0.0384

FRACTION OF ACCUMULATIONS BEING OIL

Fraction NA Gas=1-Fraction(Oil)

0

1

Allocation (percent):

	Land	Oil	Gas
Federal	95		95
State	2		2
Native	3		3

Assessor's Name:

Ken Bird & Phil Nelson

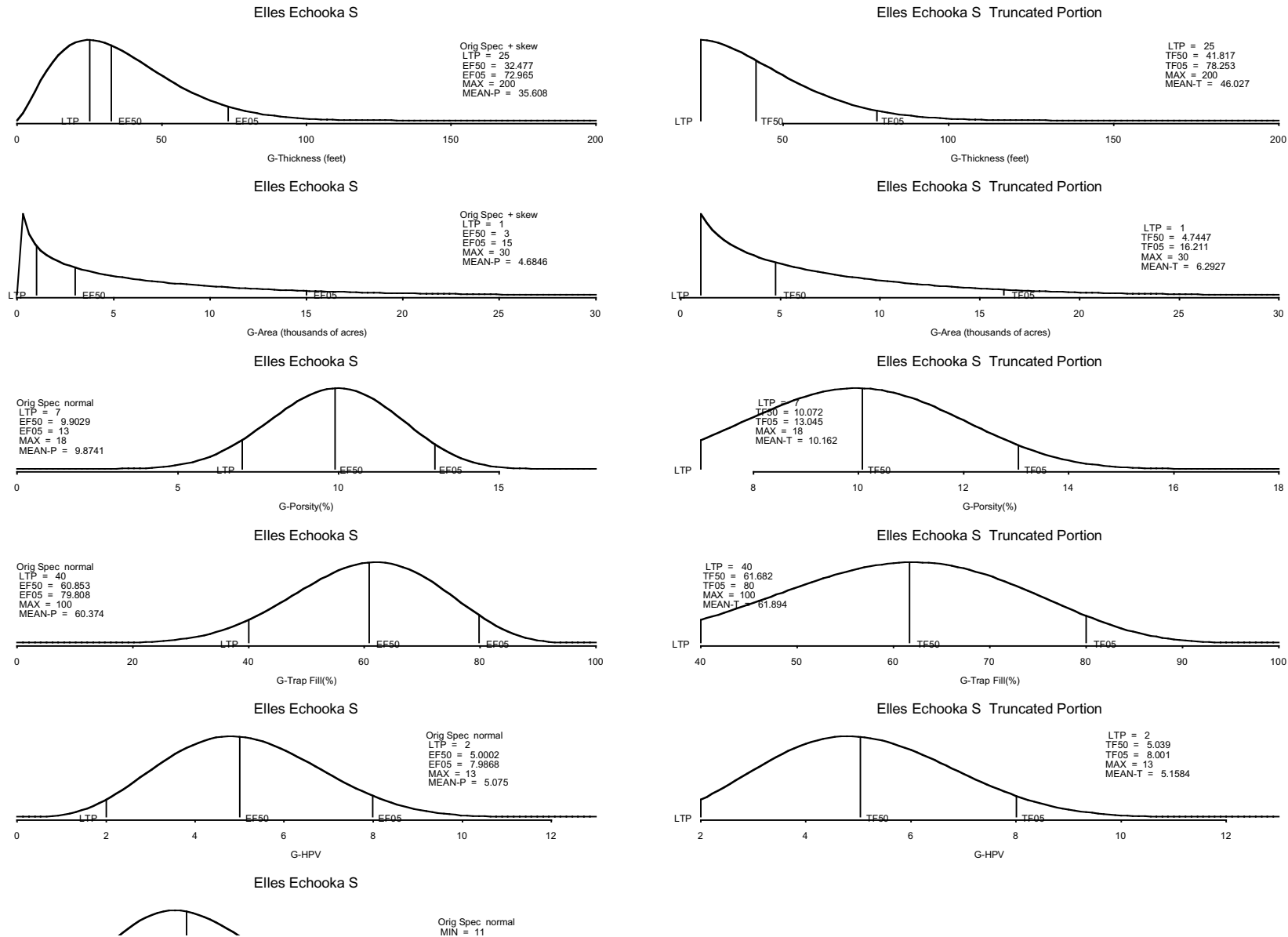
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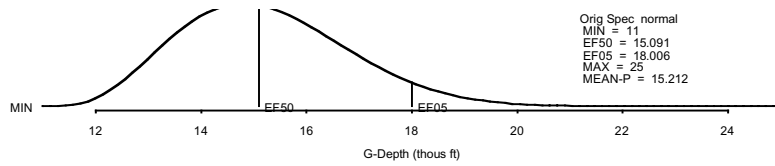
10/23/01

Date of Simulation Run MM/DD/YYYY:

2/6/02

Table 26d: Distribution of fitted hydrocarbon volume attributes, trap depth, and number of prospects for the Ellesmerian Echooka South Play





Elles Echooka S

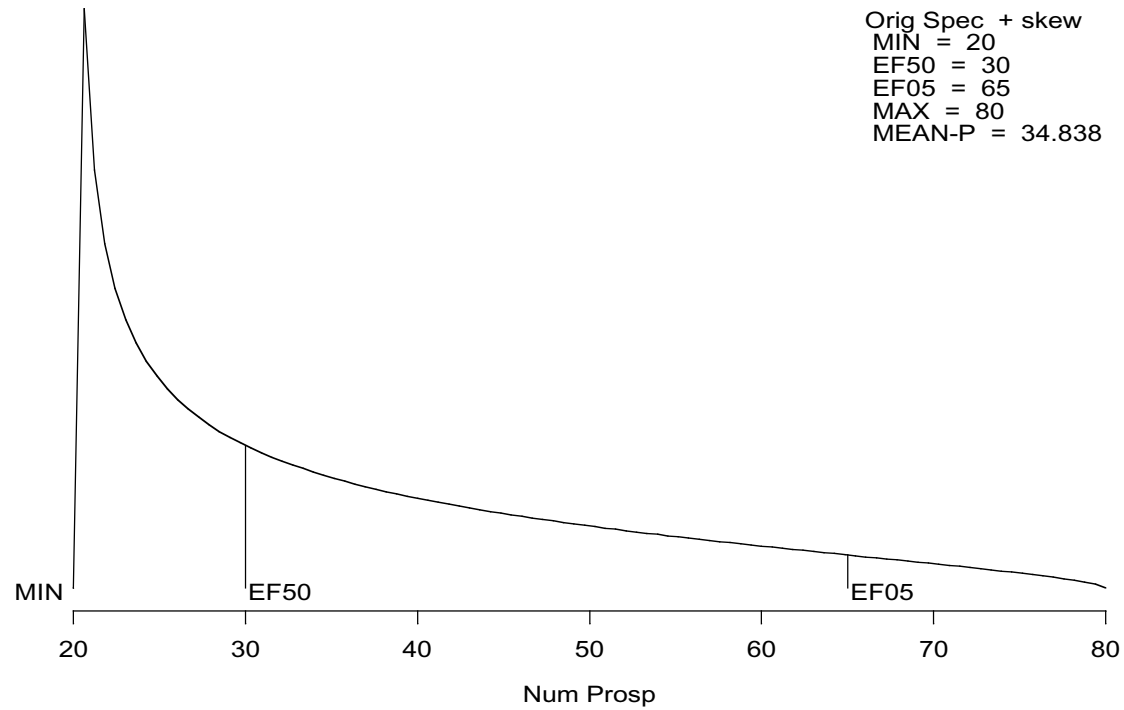
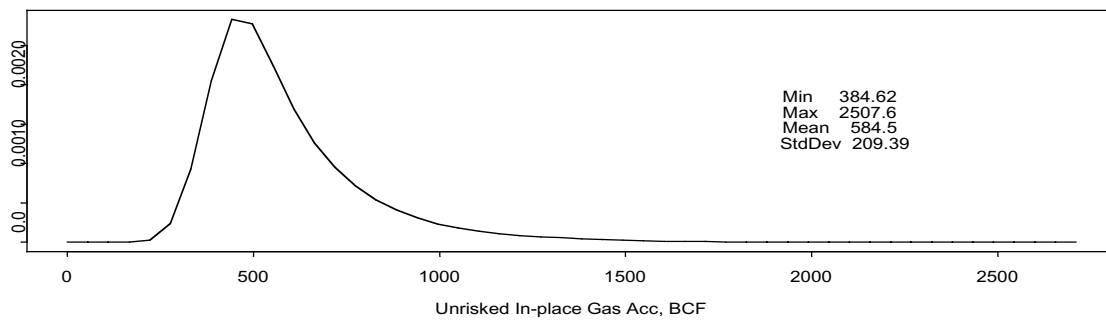


Table 26e: Estimated undiscovered oil and gas resources for the Ellesmerian Echooka South Play
Deposit

Ellesmerian Echooka S



Play Stats

Resource	Unit	Mean	StdDev	F95	F50	F05
In-place oil	MMBO					
In-place NA gas	BCFG	777.19	1162.52	0.00	0.00	3211.43
Recov oil	MMBO					
Recov assoc diss gas	BCFG					
Recov NA gas	BCFG	505.17	755.64	0.00	0.00	2087.43
Recov NGL (ADG)	MMBO					
Recov NGL (NAG)	MMBO	14.00	21.00	0.00	0.00	58.31
Num oil deposits						
Num NA gas deposits		1.33	1.94	0.00	0.00	5.00

RNS=525

Play Totals Ellesmerian Echooka S

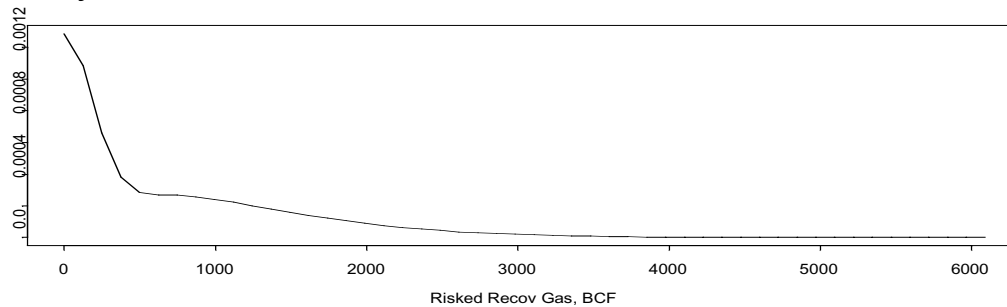


Table 26f: Estimated undiscovered oil and gas resources for the Ellesmerian Echooka South Play showing number of deposits and volumes by accumulation size class

Start size class	Oil deposits	Oil (MMBO_	Start size class	Gas deposits	NA Gas (BCFG)
0			0	0.00	0.00
8			48	0.00	0.00
16			96	0.00	0.00
32			192	0.87	264.72
64			384	0.43	212.48
128			768	0.03	27.84
256			1536	0.00	0.16
512			3072		
Totals	0.00	0.00		1.33	505.19

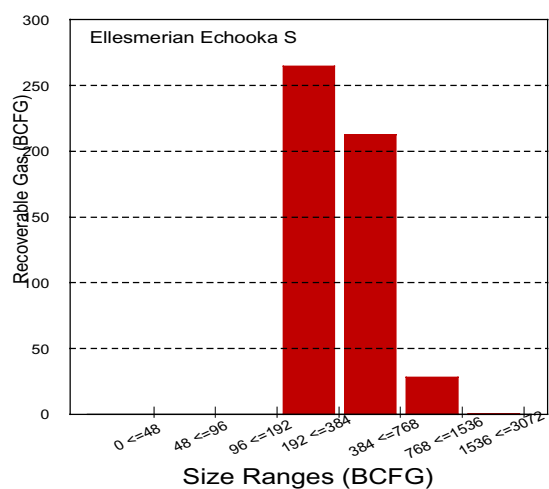
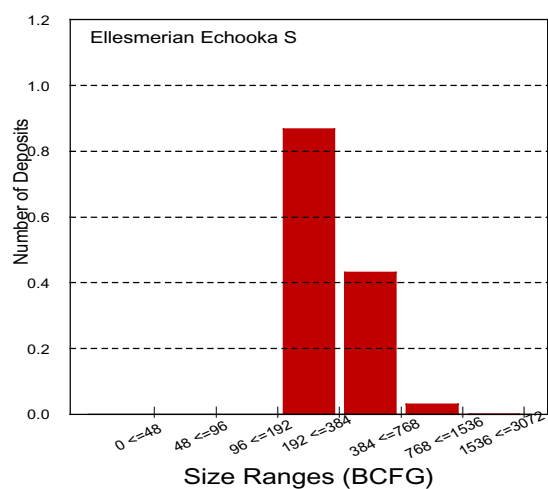


Table 27a: Input values for oil accumulations in the Ellesmerian Lisburne North Play
NPRA Assessment Form-2001

PLAY:	Ellesmerian Lisburne North
Play area:	3,394 10 ³ Acres

OIL ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵	
		LTP	0.50	0.05	Max		
NET RESERVOIR THICKNESS ¹	4	40	100	200	300	3	0.56 Corr(nrt,ac)
AREA OF CLOSURE ²	2	1.5	2.0	10.0	20.0	3	
POROSITY ^{3,4}	2	7	10	18	22	2	
TRAP FILL ³	6	50	80	99	100		Enter POR*Sw
HYDROCARBON PORE VOL ^{3,4}	4	5	8	16	20		2
Approx mm bbl (fvf=1)		11.6	99.3	2457.7	9309.6		
Recov mm bbl at surface		2.4	20.8	515.6	1952.9		

1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

TRAP DEPTH (in 1000 ft) (from sea level)	4	8	10	11	15	1
	Surface to sea level correction (1000 ft):				0.097	

OIL ACCUMULATION CHARACTERISTICS

Oil recovery factor %

Type of reservoir-drive (check any that apply):
Water: Depletion: ☒ Gas expansion:

FVF (Formation volume factor, rb/stb): (at median depth) FVF=0.972+0.000147*F^{1.175}

Pressure(psi)	5000	P=TD*0.5*1000	TD=trap depth (thous ft), P=pressure (psi)
temp(deg F)	220	T=19*TD+30	T=temp deg F LN is log base e
SolGasGr	0.738	SGG=((0.1402*LN(C27+14.7)-0.4227)+(0.1369*LN(C28)+0.0156)+(0.1704*LN(E3 AG=API gravity	
F	940	Uncorrected GOR=SGG*((P+14.7)*10^(0.0125*AG))/(18*10^(0.00091*T)))^(1/0.83)	

F= Final GOR*(SGG/OG)^0.5+1.25*T OG=141.5/(131.5+AG)

GOR (Associated gas to oil ratio, cu.ft./bbl, at stp): Final GOR at median depth
 Uncorrected GOR

NGLR (Natural gas liquids to associated gas ratio, bbls/million cu.ft., at stp)= 4.5985*exp(.1711*TD) (median depth)

Oil quality parameters:
Source: Lisburne
API gravity Oil Grav (ratio)
Sulfur content of oil

Associated gas quality parameters:
Hydrogen sulfide %
CO2 contamination %
Other inert gases:
Name: Percent:
Name: Percent:

TIME OF TRAP DEVELOPMENT	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)	325	115	100
STRUCTURAL COMPONENT (Ma)	140	130	100

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Note: only enter play name and assessor's name on Oil worksheet

Table 27b: Input values for nonassociated gas accumulations in the Ellesmerian Lisburne North Play
NPRA Assessment Form-2001
PLAY: **Ellesmerian Lisburne North**

NONASSOCIATED GAS ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵	
		LTP	50	5	Max		
NET RESERVOIR THICKNESS ¹	4	40	100	200	300	3	0.56
AREA OF CLOSURE ²	2	1.5	2.0	10.0	20.0	3	
POROSITY ^{3,4}	2	7	10	18	22	2	
TRAP FILL ³	6	50	80	99	100		Uses oil POR*Sw
HYDROCARBON PORE VOL ^{3,4}	4	5	8	16	20		2
Approx in place bcf		0.07	0.56	13.80	52.27		
Recov bcf at surface		10.8	92.3	2284.6	8653.9		
1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0							
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point							
TRAP DEPTH (in 1000 ft)	4	8	10	11	15	1	
(from sea level)		Surface to sea level correction (1000 ft):			0.097		

NONASSOCIATED GAS ACCUMULATION CHARACTERISTICS

NA Gas recovery factor %

Type of reservoir-drive (check any that apply):
Water: Gas expansion:

Natural gas liquids plus condensate to non-associated gas (bbls/million cf) (in place):
NGL-NAG=1.785*TD (at median)

Non-associated gas quality parameters:
Hydrogen sulfide %
CO2 contamination %
Other inert gases:
Name: Percent:
Name: Percent:

Gas fvf (at median depth) Gas fvf= $752.2 \cdot (1 - \exp(-0.05728 \cdot TD))$ TD<=5.67 thous ft
 $113.3 + 21.1 \cdot TD - 0.812 \cdot TD^2 + 0.0116 \cdot TD^3$ 5.67<TD<=30
TD=trap depth (thous ft)

TIME OF TRAP DEVELOPMENT

	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)	325	115	100
STRUCTURAL COMPONENT (Ma)	140	130	100

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Table 27c: Input risking values for the Ellesmerian Lisburne North Play
NPRA Assessment Form-2001

Play: **Ellesmerian Lisburne North**

RISKING

MINIMUM ACCUMULATION SIZE, MAS (Millions of BBL in place)

50

PRERISKED FREQUENCY DISTRIBUTION (Oil plus Gas)

NUM OF PROSPECTS > MINIMUM SIZE	Est Shape	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
	Min	50	5	Max		
	2	15	20	30	40	3

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

ATTRIBUTES

PLAY CHARGE (C)
 ATTRIBUTES TRAP (T)
 TIMING (F)

Probability that play contains at least 1 reservoir >= minimum size (CxTxF)

PROBABILITY OF FAVORABLE

Computed

0.9
0.6
1

0.54

PROSPECT CHARGE (c)
 ATTRIBUTES TRAP (t)
 TIMING (f)

Probability that a randomly chosen prospect is favorable (cxtxf)

0.3
0.1
1

0.03

Play Attributes x Prospect Attributes (CxTxFxcxtxf)

0.0162

FRACTION OF ACCUMULATIONS BEING OIL

Fraction NA Gas=1-Fraction(Oil)

0.9

0.1

Allocation (percent):

	Land	Oil	Gas
Federal	90	90	90
State	8	8	8
Native	2	2	2

Assessor's Name:

Ken Bird & Phil Nelson

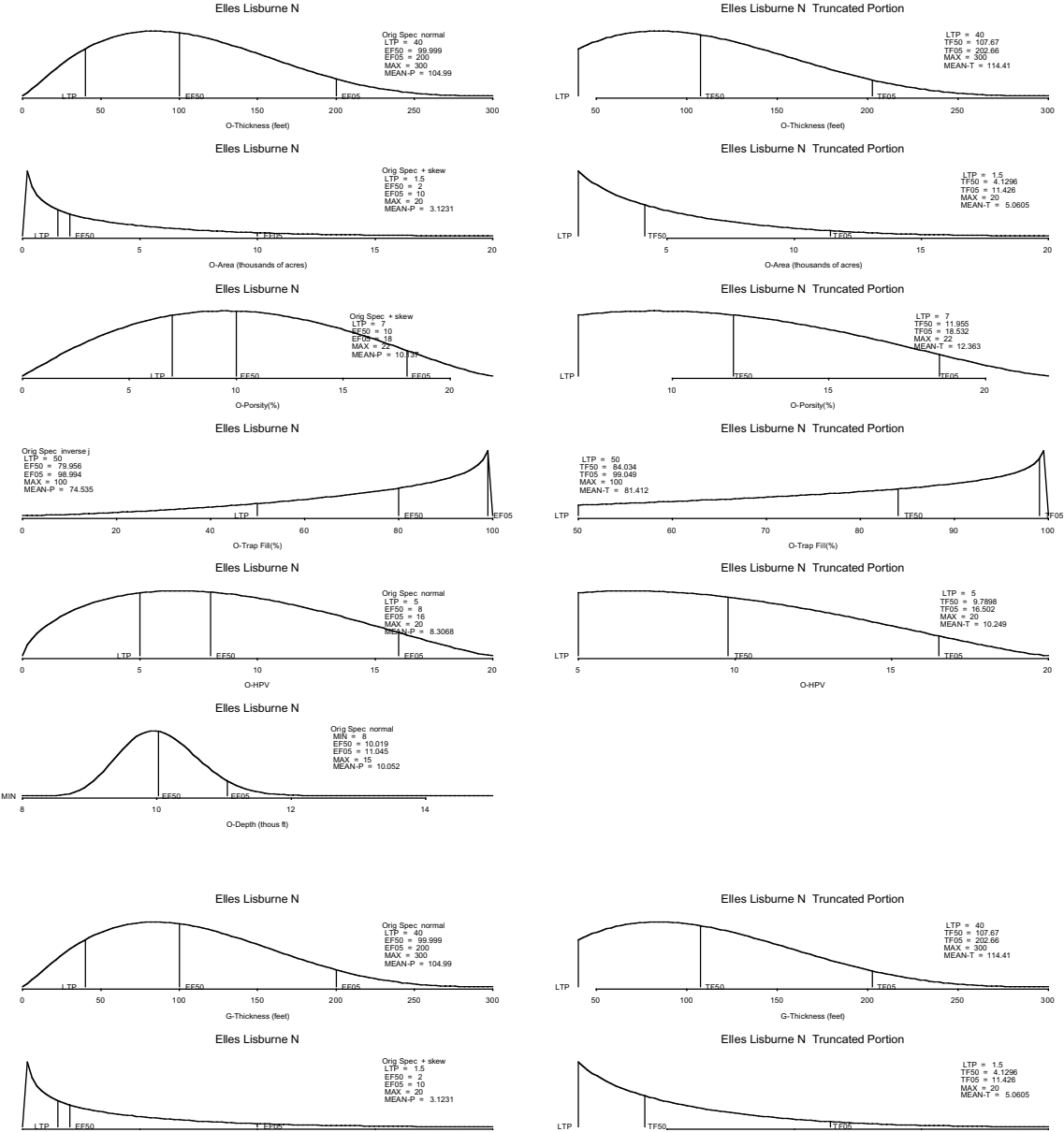
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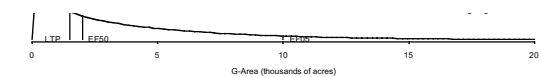
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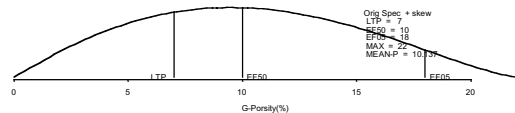
2/5/02

Table 27d: Distribution of fitted hydrocarbon volume attributes, trap depth, and number of prospects for the Ellesmerian Lisburne North Play

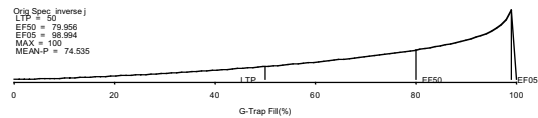




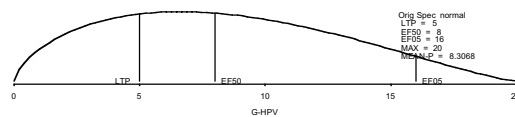
Elles Lisburne N



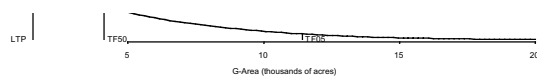
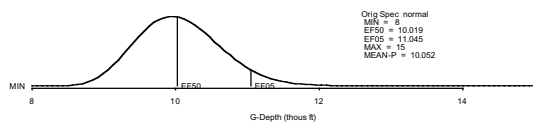
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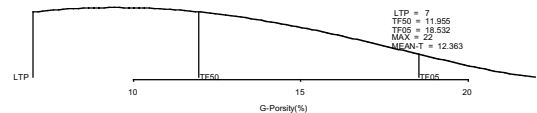
Elles Lisburne N



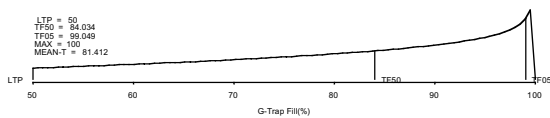
Elles Lisburne N



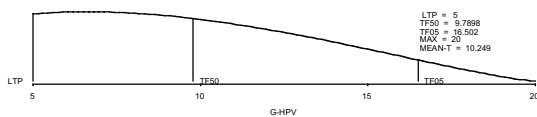
Elles Lisburne N Truncated Portion



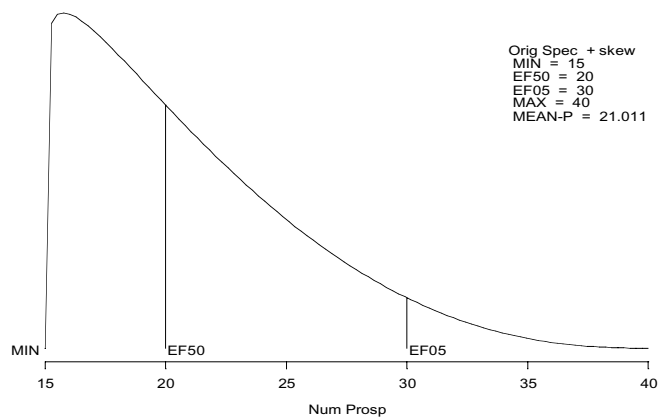
Elles Lisburne N Truncated Portion



Elles Lisburne N Truncated Portion

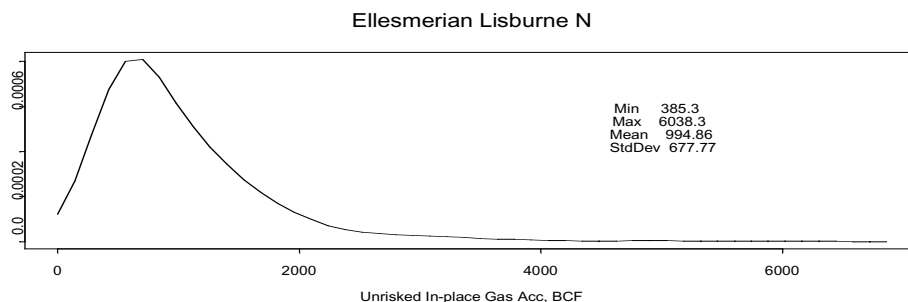
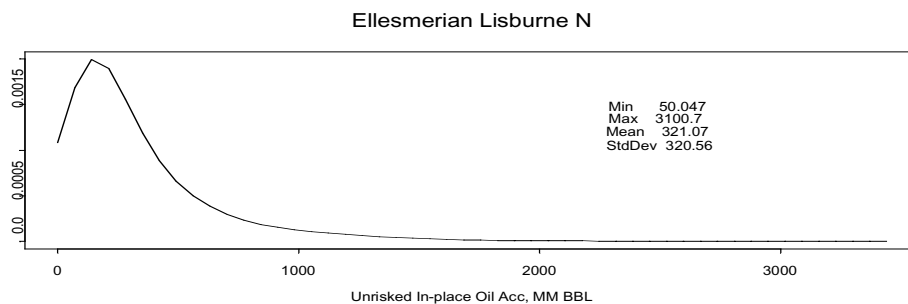


Elles Lisburne N



Orig Spec + skew
MIN = 15
EF50 = 20
EF05 = 30
MAX = 40
MEAN-P = 21.011

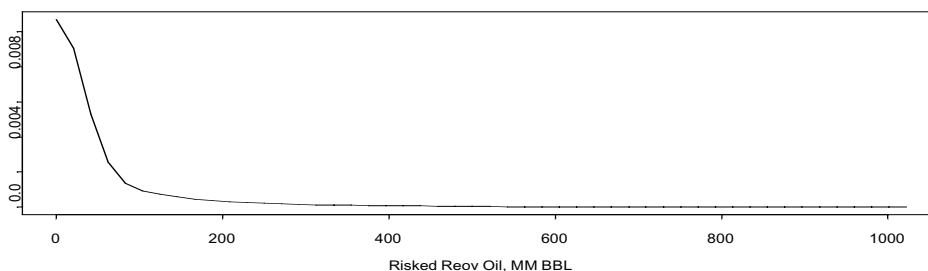
Table 27e: Estimated undiscovered oil and gas resources for the Ellesmerian Lisburne North Play
Deposit



Play Stats						
Resource	Unit	Mean	StdDev	F95	F50	F05
In-place oil	MMBO	95.68	262.52	0.00	0.00	601.71
In-place NA gas	BCFG	33.52	224.72	0.00	0.00	0.00
Recov oil	MMBO	28.70	78.76	0.00	0.00	180.51
Recov assoc diss gas	BCFG	21.45	58.86	0.00	0.00	135.35
Recov NA gas	BCFG	21.79	146.07	0.00	0.00	0.00
Recov NGL (ADG)	MMBO	0.75	2.07	0.00	0.00	4.70
Recov NGL (NAG)	MMBO	0.40	2.66	0.00	0.00	0.00
Num oil deposits		0.30	0.61	0.00	0.00	2.00
Num NA gas deposits		0.03	0.18	0.00	0.00	0.00

RNS=891

Play Totals Ellesmerian Lisburne N



Play Totals Ellesmerian Lisburne N

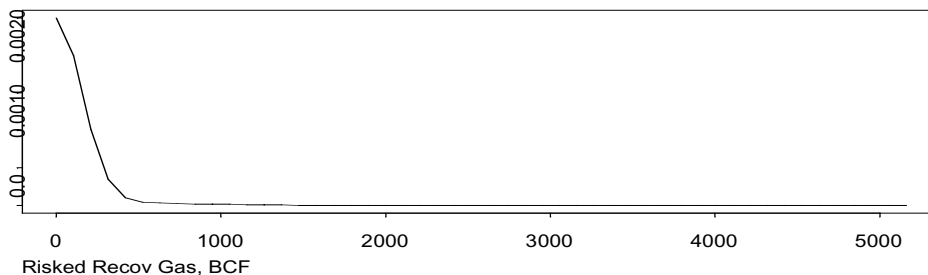


Table 27f: Estimated undiscovered oil and gas resources for the Ellesmerian Lisburne North Play showing number of deposits and volumes by accumulation size class

Start size class	Oil deposits	Oil (MMBO)	Start size class	Gas deposits	NA Gas (BCFG)
0	0.00	0.00	0	0.00	0.00
8	0.00	0.07	48	0.00	0.00
16	0.06	1.50	96	0.00	0.00
32	0.08	3.87	192	0.01	3.31
64	0.08	7.15	384	0.01	7.39
128	0.05	8.43	768	0.01	7.99
256	0.02	6.46	1536	0.00	2.55
512	0.00	1.24	3072	0.00	0.55
Totals	0.30	28.71		0.03	21.79

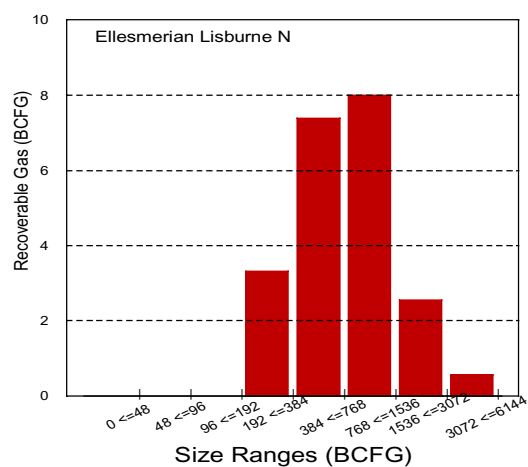
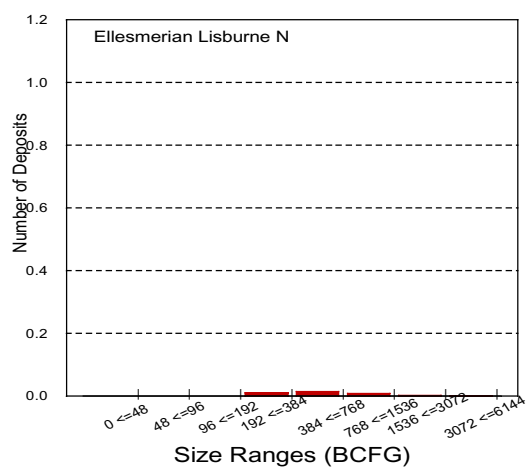
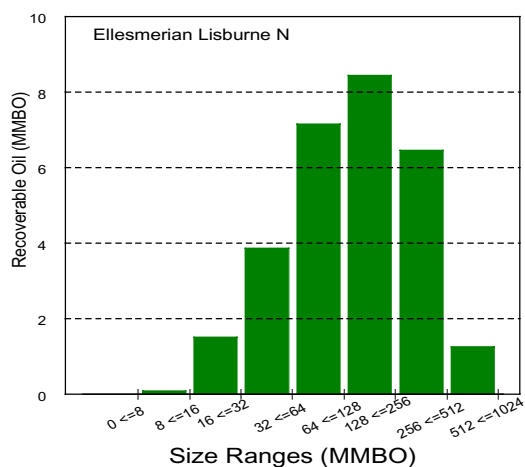
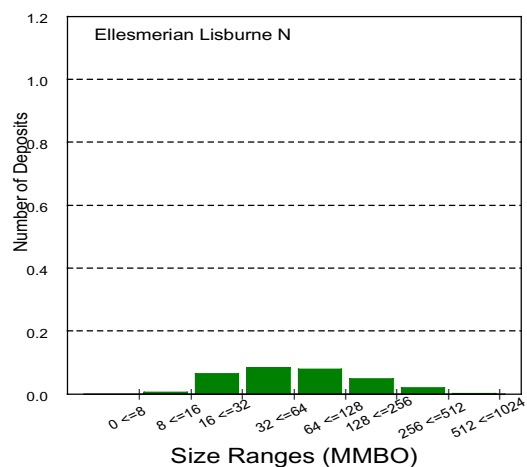


Table 28a: Input values for oil accumulations in the Ellesmerian Lisburne South Play

NPRA Assessment Form-2001

PLAY:	Ellesmerian Lisburne South
Play area:	10 ³ Acres

OIL ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		LTP	0.50	0.05	Max	
NET RESERVOIR THICKNESS ¹						
AREA OF CLOSURE ²						
POROSITY ^{3,4}						
TRAP FILL ³						
HYDROCARBON PORE VOL ^{3,4}		0	0	0	0	Enter POR*Sw
Approx mm bbl (fvf=1)		0.0	0.0	0.0	0.0	

1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

TRAP DEPTH (in 1000 ft) (from sea level)					
	Surface to sea level correction (1000 ft):				

OIL ACCUMULATION CHARACTERISTICSOil recovery factor %

Type of reservoir-drive (check any that apply):

Water: Depletion: ☒Gas expansion:

FVF (Formation volume factor, rb/stb):

#NUM! (at median depth)

FVF=0.972+0.000147*F^{1.175}

Pressure(psi)	0
temp(deg F)	30
SolGasGr	#NUM!
F	#NUM!

P=TD*0.5*1000 TD=trap depth (thous ft), P=pressure (psi)

T=19*TD+30

T=temp deg F

LN is log base e

SGG=((0.1402*LN(C27+14.7)-0.4227)+(0.1369*LN(C28)+0.0156)+(0.1704*LN(E3 AG=API gravity

Uncorrected GOR=SGG*((P+14.7)*10^(0.0125*AG))/(18*10^(0.00091*T)))^(1/0.83)

F= Final GOR*(SGG/OG)^0.5+1.25*T

OG=141.5/(131.5+AG)

GOR (Associated gas to oil ratio, cu.ft./bbl, at stp):

#NUM!

(at medium depth)

Uncorrected GOR

#NUM!

Final GOR=IF(Uncorrected<=1800,0.86*Uncorrected,Uncorrected)

NGLR (Natural gas liquids to associated gas ratio, bbls/million cu.ft., at stp):

NGLR=1e+06/(5.36E+05 * exp(-0.254 * Depth(1000 ft)))

Oil quality parameters:

API gravity

Sulfur content of oil

Associated gas quality parameters:

Hydrogen sulfide %

CO2 contamination %

Other inert gases:

Name:

Name:

Percent:

Percent:

TIME OF TRAP DEVELOPMENT

BEGIN

PEAK

END

STRATIGRAPHIC COMPONENT (Ma)

STRUCTURAL COMPONENT (Ma)

Assessor's Name:

Ken Bird & Phil Nelson

Date of Data Entry MM/DD/YYYY:

10/23/01

Date of Simulation Run MM/DD/YYYY:

Note: only enter play name and assessor's name on Oil worksheet

Table 28b: Input values for nonassociated gas accumulations in the Ellesmerian Lisburne South Play
NPRA Assessment Form-2001

PLAY: **Ellesmerian Lisburne South**

Play area: 6,952 10³ Acres

NONASSOCIATED GAS ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵	
		LTP	50	5	Max		
NET RESERVOIR THICKNESS ¹	4	40	100	200	300	3	0.58 =Corr(nrt,ac)
AREA OF CLOSURE ²	2	1.5	2.0	20.0	30.0	3	
POROSITY ^{3,4}	4	3	6	10	12	3	
TRAP FILL ³	4	35	50	70	100	3	Uses oil POR*Sw
HYDROCARBON PORE VOL ^{3,4}	2	1	4	8	10		2
Approx in place bcf		0.01	0.17	9.76	39.20		
Recov bcf at surface		1.7	32.4	1815.5	7294.4		

1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

TRAP DEPTH (in 1000 ft) (from sea level)	4	10	15	23	25	1
Surface to sea level correction (1000 ft):					0.237	

NONASSOCIATED GAS ACCUMULATION CHARACTERISTICS

NA Gas recovery factor % 14-Dec

Type of reservoir-drive (check any that apply):
Water: Gas expansion:

Natural gas liquids plus condensate to non-associated gas (bbls/million cf) (in place):
NGL-NAG=1.785*TD (at median)

Non-associated gas quality parameters:
Hydrogen sulfide %
CO2 contamination %
Other inert gases:
Name: Percent:
Name: Percent:

Gas fvf (at median depth) Gas fvf= 752.2*(1-EXP(-0.05728*TD)) TD<=5.67 thous ft
113.3+21.1*TD-0.812*TD^2+0.0116*TD^3 5.67<TD<=30
TD=trap depth (thous ft)

TIME OF TRAP DEVELOPMENT	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (M)	350	275	245
STRUCTURAL COMPONENT (Ma)	350	300	100

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Table 28c: Input risking values for the Ellesmerian Lisburne South Play
NPRA Assessment Form-2001

Play: **Ellesmerian Lisburne South**

RISKING

MINIMUM ACCUMULATION SIZE, MAS (bcf recov)

250

PRERISKED FREQUENCY DISTRIBUTION (Oil plus Gas)

NUM OF PROSPECTS > MINIMUM SIZE	Est Shape	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
	Min	50	5	Max		
	2	20	30	65	80	3

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

ATTRIBUTES

PLAY CHARGE (C)
 ATTRIBUTES TRAP (T)
 TIMING (F)

Probability that play contains at least 1 reservoir >= minimum size (CxTxF)

PROBABILITY OF FAVORABLE

Computed

0.9
0.6
1

0.54

PROSPECT CHARGE (c)
 ATTRIBUTES TRAP (t)
 TIMING (f)

Probability that a randomly chosen prospect is favorable (cxtxf)

0.3
0.2
1

0.06

Play Attributes x Prospect Attributes (CxTxFxcxtxf)

0.0324

FRACTION OF ACCUMULATIONS BEING OIL

Fraction NA Gas=1-Fraction(Oil)

0

1

Allocation (percent):

	Land	Oil	Gas
Federal	94		97
State	2		1
Native	4		2

Assessor's Name:

Ken Bird & Phil Nelson

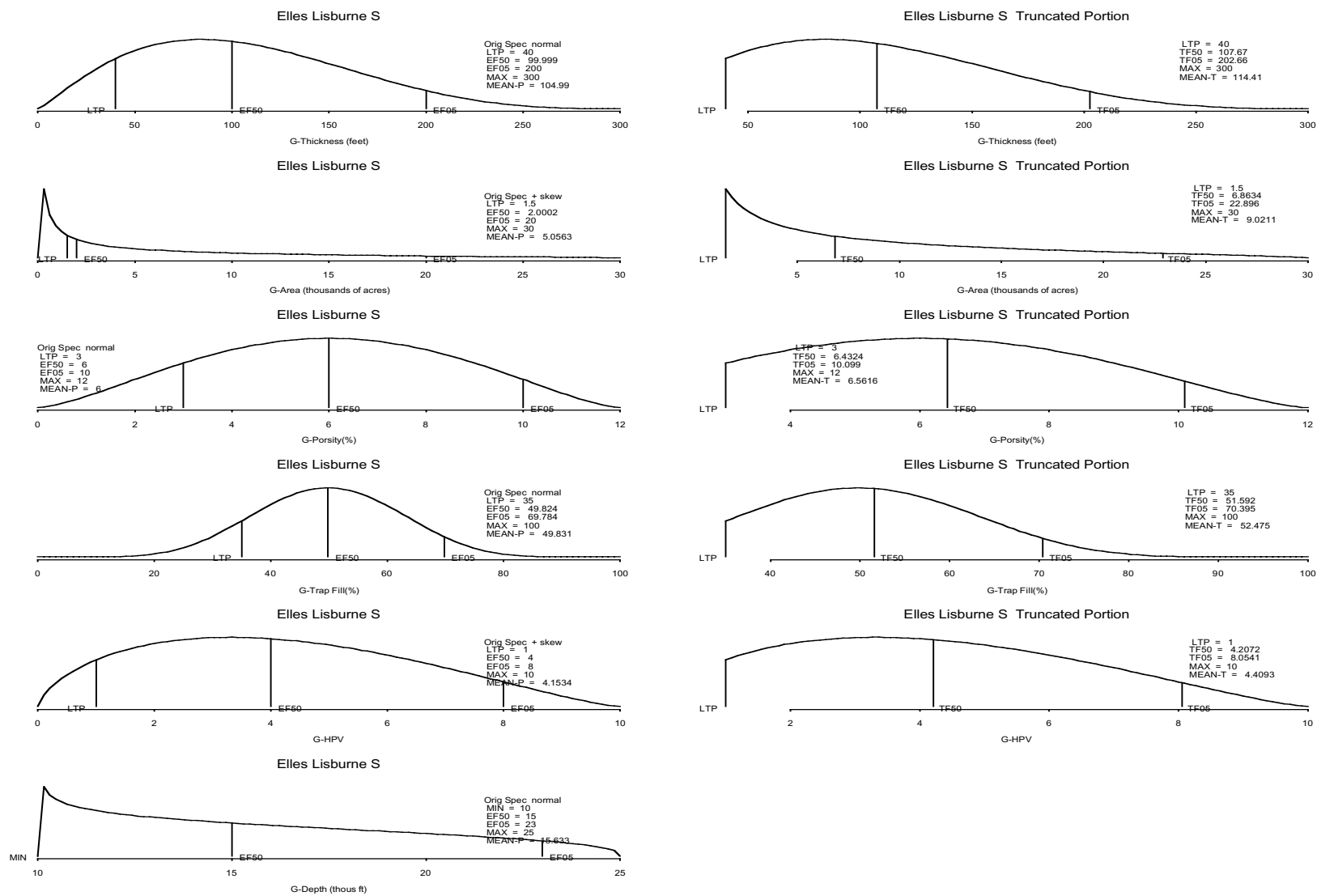
Date of Data Entry MM/DD/YYYY:

10/23/01

Date of Simulation Run MM/DD/YYYY:

2/7/02

Table 28d: Distribution of fitted hydrocarbon volume attributes, trap depth, and number of prospects for the Ellesmerian Lisburne South Play



Elles Lisburne S

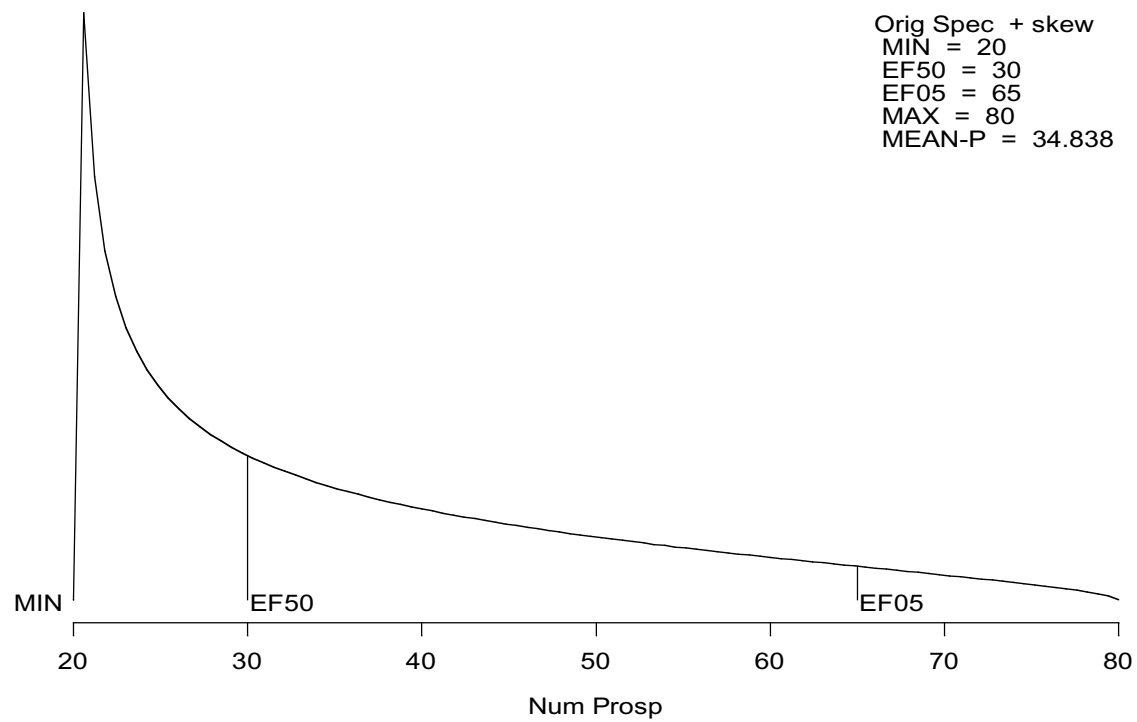
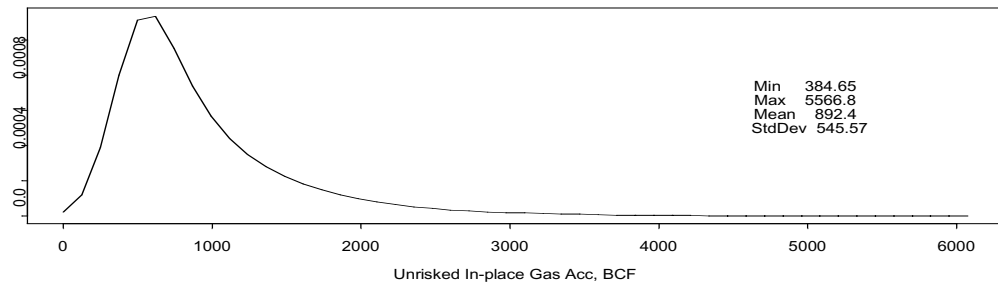


Table 28e: Estimated undiscovered oil and gas resources for the Ellesmerian Lisburne South Play
Deposit

Ellesmerian Lisburne S



Play Stats						
Resource	Unit	Mean	StdDev	F95	F50	F05
In-place oil	MMBO					
In-place NA gas	BCFG	993.83	1510.96	0.00	0.00	4203.00
Recov oil	MMBO					
Recov assoc diss gas	BCFG					
Recov NA gas	BCFG	645.99	982.12	0.00	0.00	2731.95
Recov NGL (ADG)	MMBO					
Recov NGL (NAG)	MMBO	18.64	28.98	0.00	0.00	80.54
Num oil deposits						
Num NA gas deposits		1.11	1.57	0.00	0.00	4.00

RNS=323

Play Totals Ellesmerian Lisburne S

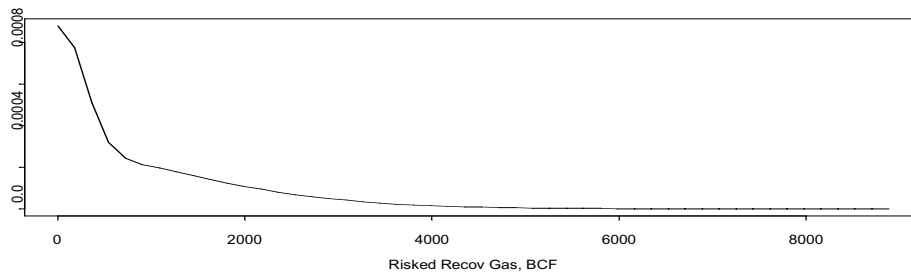


Table 28f: Estimated undiscovered oil and gas resources for the Ellesmerian Lisburne South Play showing number of deposits and volumes by accumulation size class

Start size class	Oil deposits	Oil (MMBO_	Start size class	Gas deposits	NA Gas (BCFG)
0			0	0.00	0.00
8			48	0.00	0.00
16			96	0.00	0.00
32			192	0.41	128.02
64			384	0.47	249.96
128			768	0.20	210.95
256			1536	0.03	56.57
512			3072	0.00	0.55
Totals	0.00	0.00		1.11	646.04

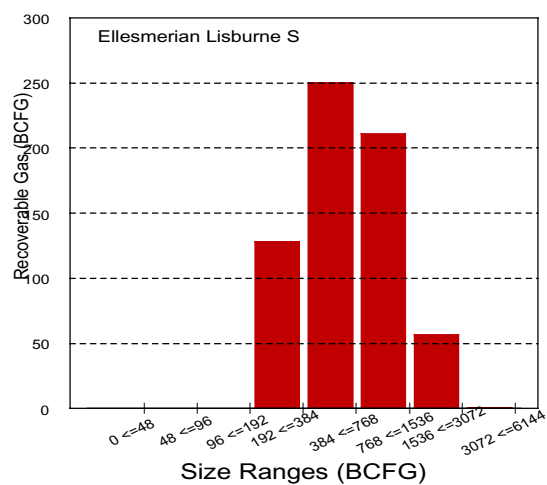
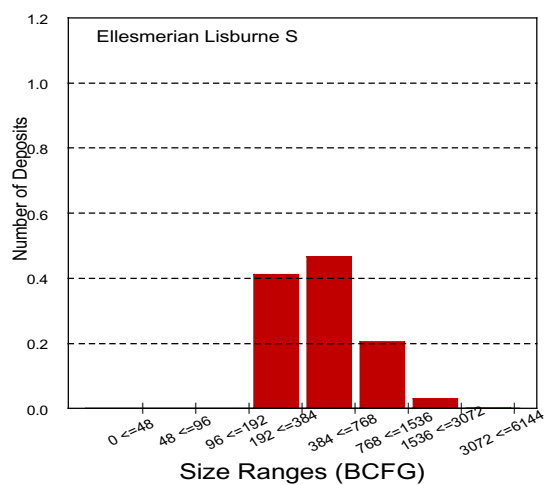


Table 29a: Input values for oil accumulations in the Ellesmerian Endicott Basins North Play

NPRA Assessment Form-2001

PLAY:	Ellesmerian Endicott Basins North
Play area:	357 10 ³ Acres

OIL ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		LTP	0.50	0.05	Max	
NET RESERVOIR THICKNESS ¹	4	30	50	75	100	3
AREA OF CLOSURE ²	2	2.0	4.0	10.0	20.0	3
POROSITY ^{3,4}	2	10	14	18	22	2
TRAP FILL ³	6	50	80	99	100	3
HYDROCARBON PORE VOL ^{3,4}	4	7	11	15	19	3
Approx mm bbl (fvf=1)		16.3	136.5	864.0	2948.0	
Recov mm bbl at surface		6.1	50.8	321.2	1095.8	

1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

TRAP DEPTH (in 1000 ft) (from sea level)	2	7	8	9	11	3
	Surface to sea level correction (1000 ft):				0.011	

OIL ACCUMULATION CHARACTERISTICS

Oil recovery factor %

Type of reservoir-drive (check any that apply):

Water: Depletion: ☒ Gas expansion:

FVF (Formation volume factor, rb/stb): (at median depth) FVF=0.972+0.000147*F^{1.175}

Pressure(psi)	4000	P=TD*0.5*1000	TD=trap depth (thous ft), P=pressure (psi)
temp(deg F)	182	T=19*TD+30	T=temp deg F LN is log base e
SolGasGr	0.721	SGG=((0.1402*LN(C27+14.7)-0.4227)+(0.1369*LN(C28)+0.0156)+(0.1704*LN(E3 AG=API gravity	
F	790	Uncorrected GOR=SGG*((P+14.7)*10 ^{0.0125} AG)/(18*10 ^{0.00091} T)) ^{1/0.83}	

F= Final GOR*(SGG/OG)^{0.5+1.25*T} OG=141.5/(131.5+AG)

GOR (Associated gas to oil ratio, cu.ft./bbl, at stp): Final GOR at median depth

Uncorrected GOR

NGLR (Natural gas liquids to associated gas ratio, bbls/million cu.ft., at stp)= 4.5985*exp(.1711*TD) (median depth)

Oil quality parameters: Source: Shublik w/poss Kingak.HRZ

API gravity	25	Oil Grav (ratio)	0.904
Sulfur content of oil	1.4		

Associated gas quality parameters:

Hydrogen sulfide %	
CO2 contamination %	

Other inert gases:

Name:		Percent:	
Name:		Percent:	

TIME OF TRAP DEVELOPMENT

	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)	350	115	100
STRUCTURAL COMPONENT (Ma)	140	130	100

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Note: only enter play name and assessor's name on Oil worksheet

**Table 29b: Input values for nonassociated gas accumulations in the Ellesmerian Endicott North Play
NPRA Assessment Form-2001**

PLAY:

NONASSOCIATED GAS ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		LTP	50	5	Max	
NET RESERVOIR THICKNESS ¹	4	30	50	75	100	
AREA OF CLOSURE ²	2	2.0	4.0	10.0	20.0	
POROSITY ^{3,4}	2	10	14	18	22	
TRAP FILL ³	6	50	80	99	100	
HYDROCARBON PORE VOL ^{3,4}	4	7	11	15	19	Uses oil POR*Sw 3
Approx in place bcf		0.09	0.77	4.85	16.55	
Recov bcf at surface		14.0	117.6	744.4	2540.0	

1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

TRAP DEPTH (in 1000 ft) (from sea level)	2	7	8	9	11	3
	Surface to sea level correction (1000 ft):					0.011

NONASSOCIATED GAS ACCUMULATION CHARACTERISTICS

NA Gas recovery factor % **65**

Type of reservoir-drive (check any that apply):
 Water: ☐ Gas expansion: ☐

Natural gas liquids plus condensate to non-associated gas (bbls/million cf) (in place):
 NGL-NAG=1.785*TD **14.3** (at median)

Non-associated gas quality parameters:
 Hydrogen sulfide %
 CO2 contamination %
 Other inert gases:
 Name: Percent:
 Name: Percent:

Gas fvf **236.1** (at median depth) Gas fvf= $752.2 \cdot (1 - \exp(-0.05728 \cdot TD))$ TD ≤ 5.67 thous ft
 $113.3 + 21.1 \cdot TD - 0.812 \cdot TD^2 + 0.0116 \cdot TD^3$ 5.67 < TD ≤ 30
 TD=trap depth (thous ft)

TIME OF TRAP DEVELOPMENT

	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)	350	115	100
STRUCTURAL COMPONENT (Ma)	140	130	100

Assessor's Name: **Phil Nelson**

Date of Data Entry MM/DD/YYYY: **10/23/01**

Date of Simulation Run MM/DD/YYYY: **2/6/02**

Table 29c: Input risking values for the Ellesmerian Endicott Basins North Play
NPRA Assessment Form-2001

Play: **Ellesmerian Endicott Basins North**

RISKING

MINIMUM ACCUMULATION SIZE, MAS (Millions of BBL in place)

50

PRERISKED FREQUENCY DISTRIBUTION (Oil plus Gas)

NUM OF PROSPECTS > MINIMUM SIZE	Est Shape	LTP	50	5	Max	Knowledge Level 1-3 ⁵
	2	1	3	5	7	3

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

ATTRIBUTES

PLAY CHARGE (C)
 ATTRIBUTES TRAP (T)
 TIMING (F)

Probability that play contains at least 1 reservoir >= minimum size (CxTxF)

PROBABILITY OF FAVORABLE

Computed

0.9
0.6
1

0.54

PROSPECT CHARGE (c)
 ATTRIBUTES TRAP (t)
 TIMING (f)

Probability that a randomly chosen prospect is favorable (cxtxf)

0.2
0.1
1

0.02

Play Attributes x Prospect Attributes (CxTxFxcxtxf)

0.0108

FRACTION OF ACCUMULATIONS BEING OIL

Fraction NA Gas=1-Fraction(Oil)

0.9

0.1

Allocation (percent):

	Land	Oil	Gas
Federal	75	70	70
State	24	30	30
Native	1	0	0

Assessor's Name:

Phil Nelson

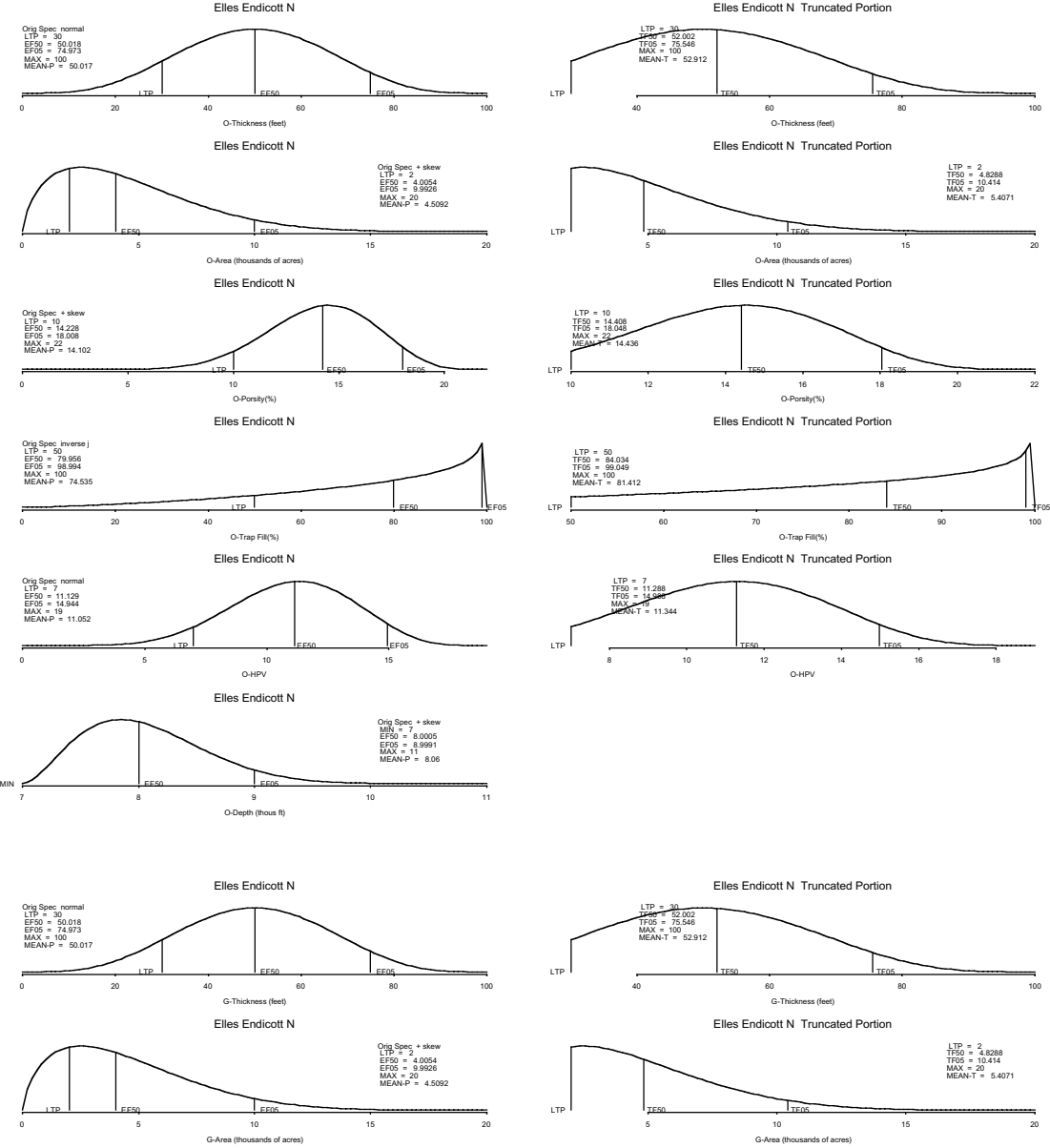
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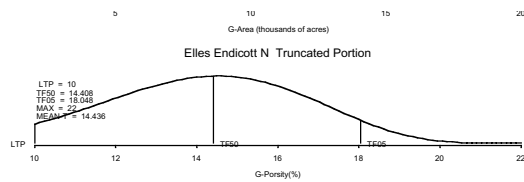
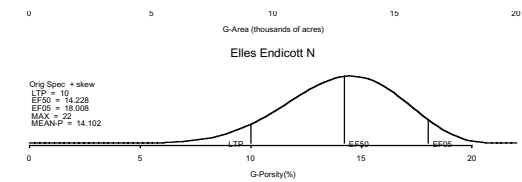
10/23/01

Date of Simulation Run MM/DD/YYYY:

2/6/02

Table 29d: Distribution of fitted hydrocarbon volume attributes, trap depth, and number of prosects for the Ellesmerian Endicott North Play





In place pre-risked accumulation

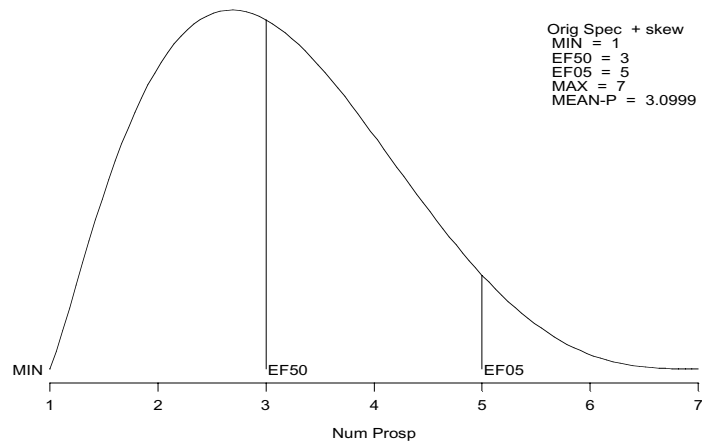
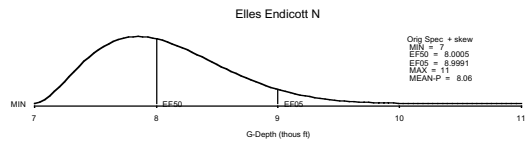
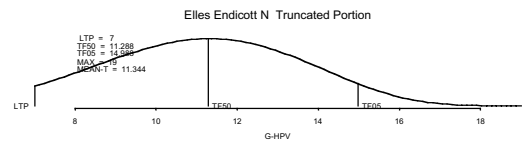
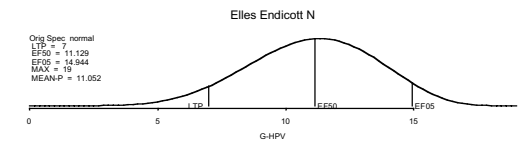
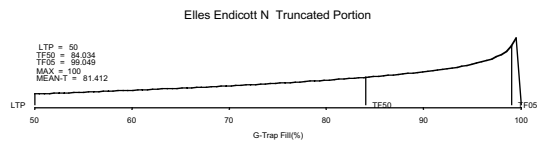
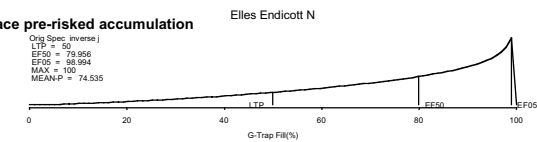
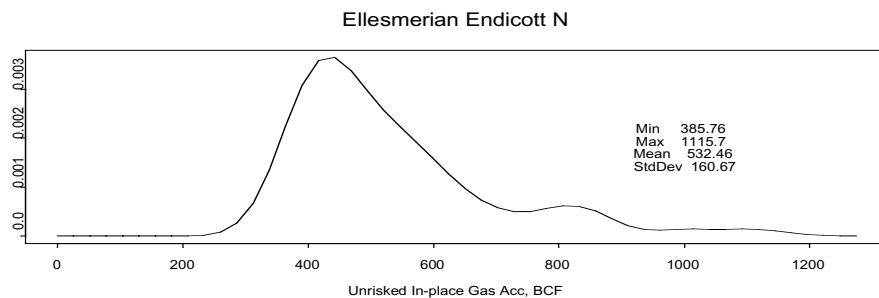
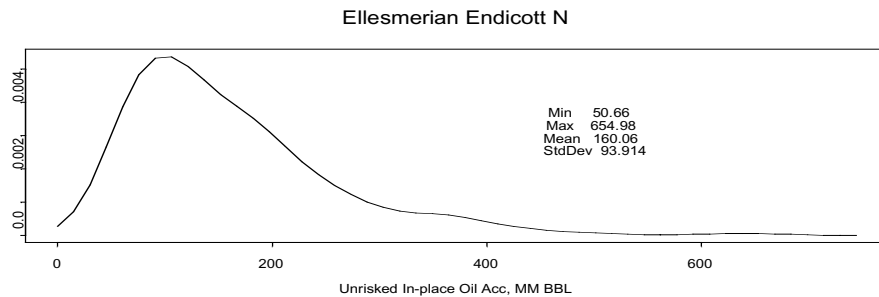


Table 29e: Estimated undiscovered oil and gas resources for the Ellesmerian Endicott North Play Deposit

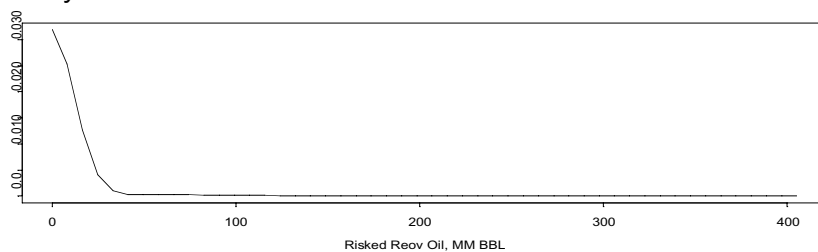


Play Stats

Resource	Unit	Mean	StdDev	F95	F50	F05
In-place oil	MMBO	5.00	32.99	0.00	0.00	0.00
In-place NA gas	BCFG	1.73	31.59	0.00	0.00	0.00
Recov oil	MMBO	2.50	16.50	0.00	0.00	0.00
Recov assoc diss gas	BCFG	1.59	10.49	0.00	0.00	0.00
Recov NA gas	BCFG	1.12	20.53	0.00	0.00	0.00
Recov NGL (ADG)	MMBO	0.05	0.30	0.00	0.00	0.00
Recov NGL (NAG)	MMBO	0.02	0.30	0.00	0.00	0.00
Num oil deposits		0.03	0.18	0.00	0.00	0.00
Num NA gas deposits		0.00	0.06	0.00	0.00	0.00

RNS=121

Play Totals Ellesmerian Endicott N



Play Totals Ellesmerian Endicott N

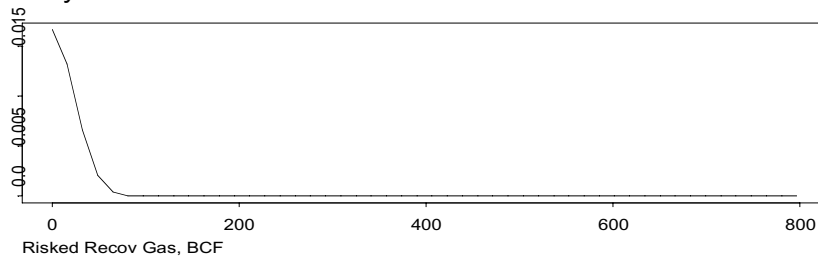


Table 29f: Estimated undiscovered oil and gas resources for the Ellesmerian Endicott North Play showing number of deposits and volumes by accumulation size class

Start size c	Oil deposits	Oil (MMBO)	Start size class	Gas deposits	NA Gas (BCFG)
0	0.00	0.00	0	0.00	0.00
8	0.00	0.00	48	0.00	0.00
16	0.00	0.07	96	0.00	0.00
32	0.01	0.58	192	0.00	0.74
64	0.01	1.11	384	0.00	0.38
128	0.00	0.69	768		
256	0.00	0.05	1536		
512			3072		
Totals	0.03	2.50		0.00	1.12

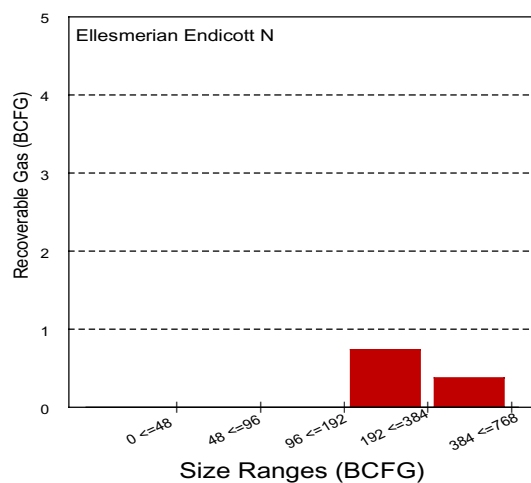
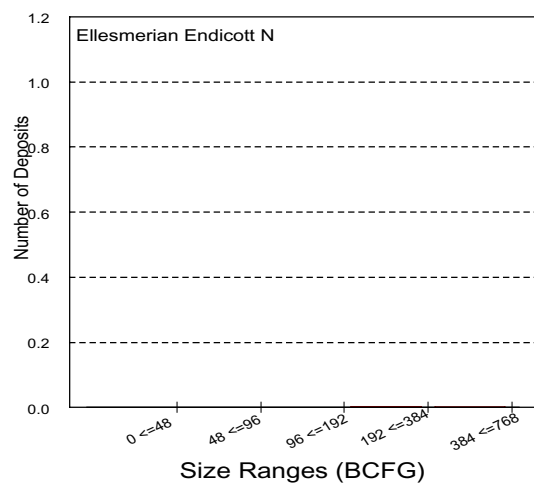
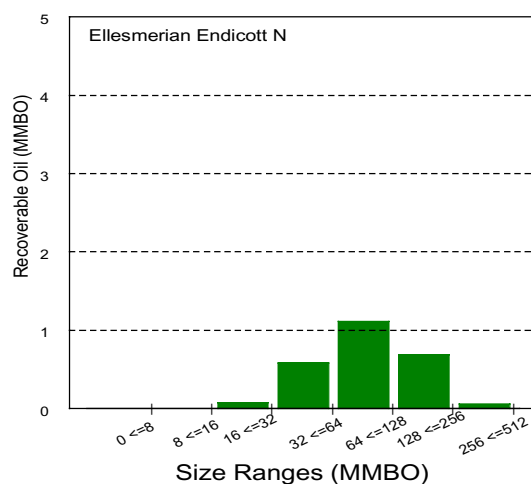
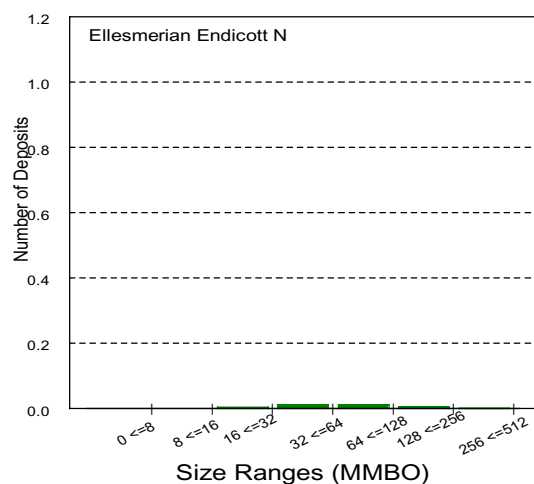


Table 30a: Input values for oil accumulations in the Ellesmerian Endicott South Play
NPRA Assessment Form-2001

PLAY:	Ellesmerian Endicott South	
Play area:		10 ³ Acres

OIL ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
		LTP	0.50	0.05	Max	
NET RESERVOIR THICKNESS ¹						
AREA OF CLOSURE ²						
POROSITY ^{3,4}						
TRAP FILL ³						
HYDROCARBON PORE VOL ^{3,4}		0	0	0	0	Enter POR*Sw
Approx mm bbl (fvf=1)		0.0	0.0	0.0	0.0	

1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

TRAP DEPTH (in 1000 ft) (from sea level)	Surface to sea level correction (1000 ft):
---	--

OIL ACCUMULATION CHARACTERISTICS

Oil recovery factor %

Type of reservoir-drive (check any that apply):

Water: ☐ Depletion: ☒ Gas expansion: ☐

FVF (Formation volume factor, rb/stb):

GOR (Associated gas to oil ratio, cu.ft./bbl, at stp):

NGLR (Natural gas liquids to associated gas ratio, bbls/million cu.ft., at stp):

Oil quality parameters:

API gravity

Sulfur content of oil

Associated gas quality parameters:

Hydrogen sulfide %

CO2 contamination %

Other inert gases:

Name:	<input type="text"/>	Percent:	<input type="text"/>
Name:	<input type="text"/>	Percent:	<input type="text"/>

TIME OF TRAP DEVELOPMENT

	BEGIN	PEAK	END
STRATIGRAPHIC COMPONENT (Ma)			
STRUCTURAL COMPONENT (Ma)			

Assessor's Name:

Date of Data Entry MM/DD/YYYY:

Date of Simulation Run MM/DD/YYYY:

Note: only enter play name and assessor's name on Oil worksheet

Table 30b: Input values for nonassociated gas accumulations in the Ellesmerian Endicott South Play
NPRA Assessment Form-2001

PLAY: **Ellesmerian Endicott South**

Play area: 6,993 10³ Acres

NONASSOCIATED GAS ACCUMULATION VOLUME PARAMETERS

ATTRIBUTES	Est Shape (1 to 5)	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵	
		LTP	50	5	Max		
NET RESERVOIR THICKNESS ¹	2	50	100	175	350	3	0.86
AREA OF CLOSURE ²	2	2.0	3.5	40.0	50.0	2	
POROSITY ^{3,4}	4	10	14	18	20	3	
TRAP FILL ³	3	35	50	70	100	3	POR*Sw
HYDROCARBON PORE VOL ^{3,4}	3	4	8	12	14		6
Approx in place bcf		0.06	0.61	25.61	106.72		
Recov bcf at surface		12.0	120.2	5049.5	21039.7		
1-thickness in feet, 2-thousands of acres, 3-percent, 4-correlation between Porosity and Water Saturation = -1.0							
5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point							
TRAP DEPTH (in 1000 ft)	4	10	20	22	25	1	
(from sea level)		Surface to sea level correction (1000 ft):			0.23		

NONASSOCIATED GAS ACCUMULATION CHARACTERISTICS

NA Gas recovery factor % 65

Type of reservoir-drive (check any that apply):

Water:

Gas expansion:

Natural gas liquids plus condensate to non-associated gas (bbls/million cf) (in place):

NGL-NAG=1.785*TD 35.7 (at median)

Non-associated gas quality parameters:

Hydrogen sulfide %

CO2 contamination %

Other inert gases:

Name:

Percent:

Name:

Percent:

Gas fvf 303.3

(at median depth)

Gas fvf= 752.2*(1-EXP(-0.05728*TD))

TD<=5.67 thous ft

113.3+21.1*TD-0.812*TD^2+0.0116*TD^3

5.67<TD<=30

TD=trap depth (thous ft)

TIME OF TRAP DEVELOPMENT

STRATIGRAPHIC COMPONENT (Ma)

STRUCTURAL COMPONENT (Ma)

BEGIN

PEAK

END

360

355

350

360

300

100

Assessor's Name:

Ken Bird & Phil Nelson

Date of Data Entry MM/DD/YYYY:

10/23/01

Date of Simulation Run MM/DD/YYYY:

2/6/02

Table 30c: Input risking values for the Ellesmerian Endicott South Play
NPRA Assessment Form-2001

Play: **Ellesmerian Endicott South**

RISKING

MINIMUM ACCUMULATION SIZE, MAS (bcf recov)

250

PRERISKED FREQUENCY DISTRIBUTION (Oil plus Gas)

NUM OF PROSPECTS > MINIMUM SIZE	Est Shape	PROB OF AND GREATER THAN				Knowledge Level 1-3 ⁵
	Min	50	5	Max		
	2	30	50	80	90	2

5-Knowledge Level: 1=High, 2=Medium, 3=Low; LTP=Left Truncation Point

ATTRIBUTES

PLAY CHARGE (C)
 ATTRIBUTES TRAP (T)
 TIMING (F)

Probability that play contains at least 1 reservoir >= minimum size (CxTxF)

PROBABILITY OF FAVORABLE

Computed

1
0.6
1

0.6

PROSPECT CHARGE (c)
 ATTRIBUTES TRAP (t)
 TIMING (f)

Probability that a randomly chosen prospect is favorable (cxtxf)

0.3
0.1
0.9

0.027

Play Attributes x Prospect Attributes (CxTxFxcxtxf)

0.0162

FRACTION OF ACCUMULATIONS BEING OIL

Fraction NA Gas=1-Fraction(Oil)

0

1

Allocation (percent):

	Land	Oil	Gas
Federal	95		95
State	4		4
Native	1		1

Assessor's Name:

Ken Bird & Phil Nelson

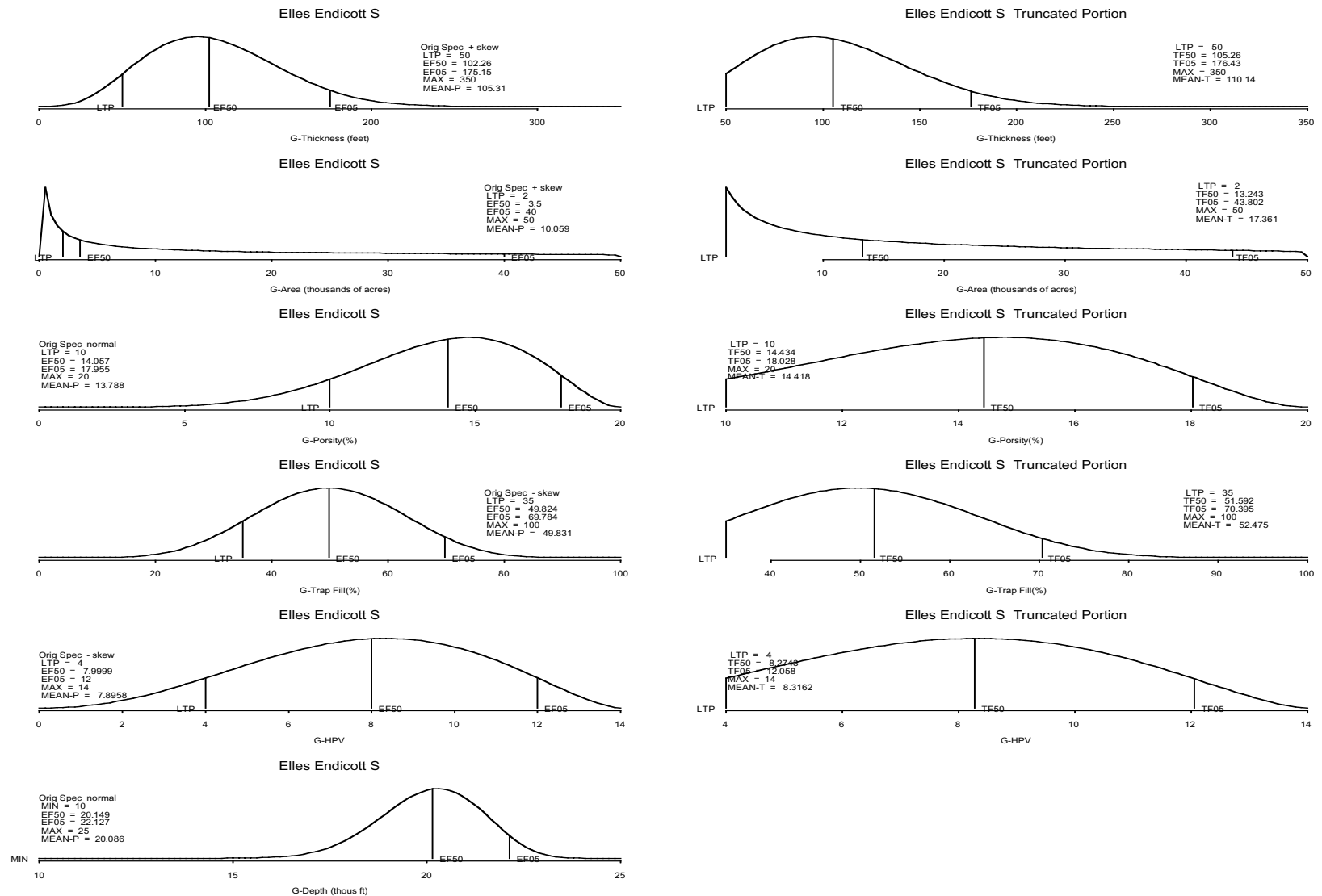
Date of Data Entry MM/DD/YYYY:

10/23/01

Date of Simulation Run MM/DD/YYYY:

2/6/02

Table 30d: Distribution of fitted hydrocarbon volume attributes, trap depth, and number of prospects for the Ellesmerian Endicott South Play



Elles Endicott S

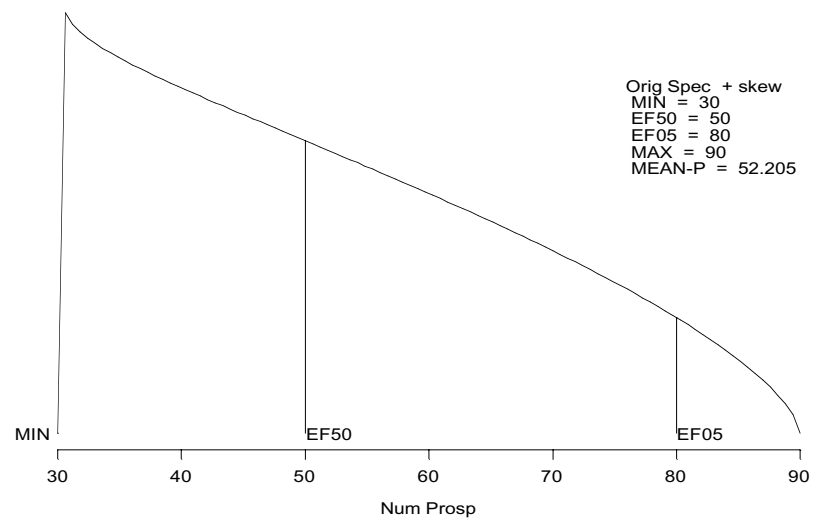
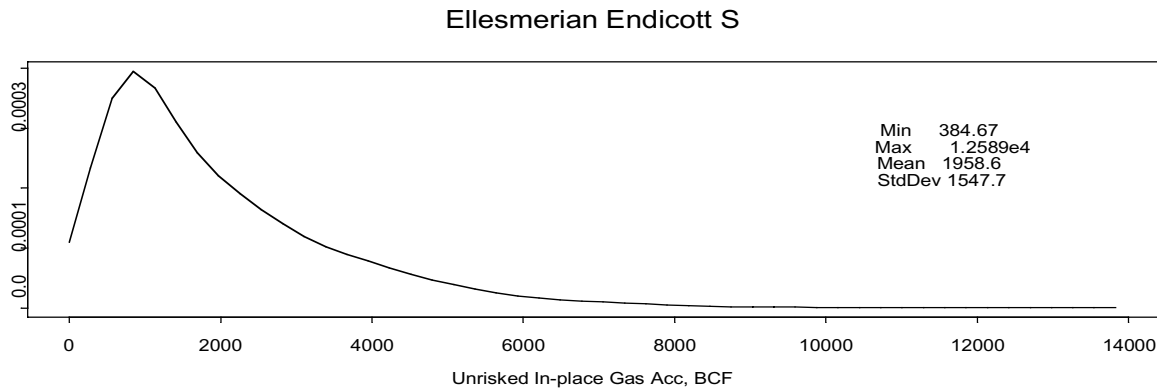


Table 30e: Estimated undiscovered oil and gas resources for the Ellesmerian Endicott South Play Deposit



Play Stats						
Resource	Unit	Mean	StdDev	F95	F50	F05
In-place oil	MMBO					
In-place NA gas	BCFG	1649.41	2722.31	0.00	0.00	7409.01
Recov oil	MMBO					
Recov assoc diss gas	BCFG					
Recov NA gas	BCFG	1072.12	1769.50	0.00	0.00	4815.86
Recov NGL (ADG)	MMBO					
Recov NGL (NAG)	MMBO	38.93	64.31	0.00	0.00	174.05
Num oil deposits						
Num NA gas deposits		0.84	1.18	0.00	0.00	3.00

RNS=588

Play Totals Ellesmerian Endicott S

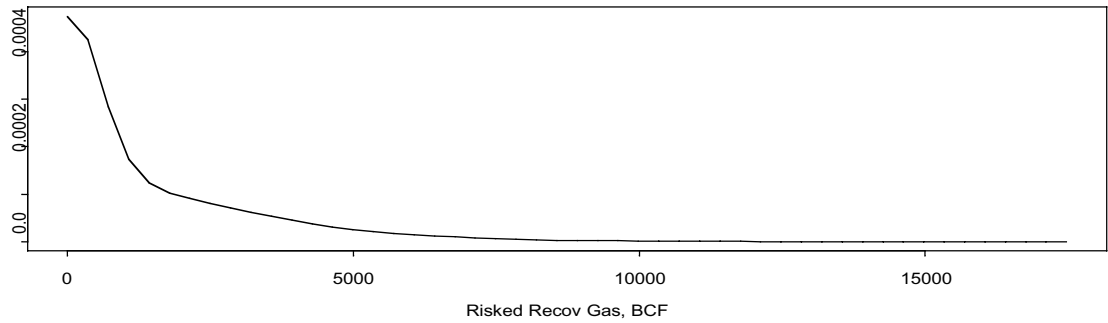
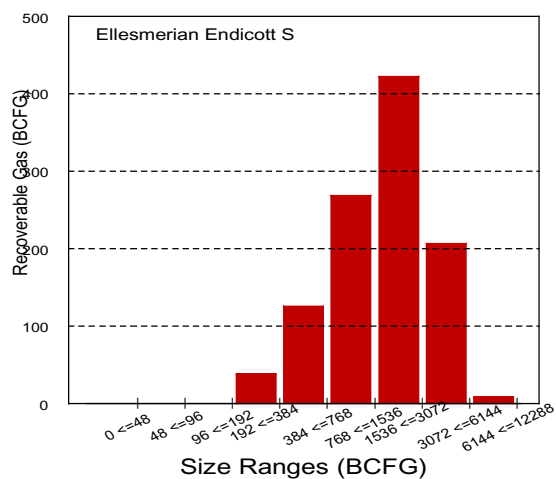
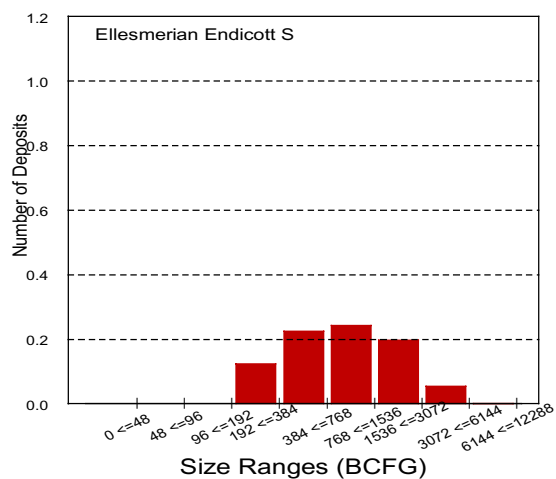


Table 30f: Estimated undiscovered oil and gas resources for the Ellesmerian Endicott South Play showing number of deposits and volumes by accumulation size class

Start size class	Oil deposits	Oil (MMBO_	Start size class	Gas deposits	NA Gas (BCFG)
0			0	0.00	0.00
8			48	0.00	0.00
16			96	0.00	0.00
32			192	0.12	38.56
64			384	0.22	125.66
128			768	0.24	269.27
256			1536	0.20	422.89
512			3072	0.05	206.94
			6144	0.00	8.88
Totals		0.00		0.84	1072.21



table_31.xls

Play	Oil Mean		NA Gas Mean		ADG Mean		NGL(adg) Mean		NGL(na)
	Total	Federal	Total	Federal	Total	Federal	Total	Federal	Total
Brookian Topset	683.1	587.4	295.7	272.1	431.3	370.9	8.3	7.1	4.0
Brookian Clinoform North	3,732.2	2985.8	1,037.0	850.3	3,178.1	2542.5	57.5	46.0	13.3
Brookian Clinoform Central	2,779.1	2723.5	8,315.3	7816.4	3,515.5	3445.2	74.5	73.0	181.9
Brookian Clinoform South-Shallow	1,692.0	1692.0	3,699.4	3699.4	1,207.0	1207.0	26.9	26.9	73.6
Brookian Clinoform South-Deep			5,827.8	5827.8					171.4
Beaufortian Cretaceous Topset North	294.5	220.8	577.9	450.7	226.3	169.7	5.5	4.1	8.5
Beaufortian Cretaceous Topset South			3,042.4	2859.9					67.4
Beaufortian Upper Jurassic Topset Northeast	10,352.1	9523.9			12,626.0	11615.9	227.8	209.6	
Beaufortian Upper Jurassic Topset Southeast			7,903.3	7903.3					190.0
Beaufortian Upper Jurassic Topset Northwest	3,718.8	2789.1			4,506.1	3379.5	81.1	60.8	
Beaufortian Upper Jurassic Topset Southwest			8,030.0	7467.9					193.1
Beaufortian Lower Jurassic Topset	275.6	223.3	1,219.9	975.9	8.4	6.8	3.2	2.6	21.3
Beaufortian Clinoform	33.5	21.8	1,264.6	1188.7	42.7	27.7	0.8	0.5	29.0
Brookian Topset Structural	391.6	387.7	17,676.1	17499.4	171.1	169.4	3.9	3.9	196.6
Torok Structural	115.6	114.4	29,842.5	29544.0	62.3	61.7	1.6	1.6	439.5
Ellesmerian Structural			3,316.9	3283.7					130.3
Thrust Belt	19.1	18.9	2,534.5	2509.2	13.3	13.1	0.3	0.3	82.1
Ellesmerian Ivishak	210.3	191.4	162.5	147.8	140.0	127.4	5.1	4.6	2.9
Ellesmerian Echooka North	17.2	14.5	11.2	9.4	11.9	10.0	0.4	0.3	0.2
Ellesmerian Echooka South			777.2	738.3					21.5
Ellesmerian Lisburne North	95.7	86.1	33.5	30.2	71.5	64.4	2.5	2.3	0.6
Ellesmerian Lisburne South			993.8	964.0					28.7
Ellesmerian Endicott North	5.0	3.5	1.7	1.2	3.2	2.2	0.1	0.1	0.0
Ellesmerian Endicott South			1,649.4	1566.9					59.9
Sum	24,415.5	21,584.2	98,212.5	95,606.5	26,214.6	23,213.5	499.4	443.7	1,915.8

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Play	Oil Mean		NA Gas Mean		ADG Mean		NGL(adg) Mean		NGL(nag)
	Total	Federal	Total	Federal	Total	Federal	Total	Federal	Total
Brookian Topset	239.1	205.6	192.2	176.8	150.9	129.8	2.9	2.5	2.6
Brookian Clinoform North	1,306.3	1045.0	674.0	552.7	1,112.3	889.9	20.1	16.1	8.6
Brookian Clinoform Central	972.7	953.2	5,404.9	5080.6	1,230.4	1,205.8	26.1	25.5	118.3
Brookian Clinoform South-Shallow	507.6	507.6	2,404.6	2404.6	362.1	362.1	8.1	8.1	47.9
Brookian Clinoform South-Deep	0.0	0.0	3,788.1	3788.1	0.0	0.0	0.0	0.0	111.4
Beaufortian Cretaceous Topset North	103.1	77.3	404.5	315.5	79.2	59.4	1.9	1.4	5.9
Beaufortian Cretaceous Topset South	0.0	0.0	2,129.7	2001.9	0.0	0.0	0.0	0.0	47.2
Beaufortian Upper Jurassic Topset Northeast	5,176.1	4762.0	0.0	0.0	6,313.0	5,808.0	113.9	104.8	0.0
Beaufortian Upper Jurassic Topset Southeast	0.0	0.0	5,137.1	5137.1	0.0	0.0	0.0	0.0	123.5
Beaufortian Upper Jurassic Topset Northwest	1,859.4	1394.6	0.0	0.0	2,253.0	1,689.8	40.5	30.4	0.0
Beaufortian Upper Jurassic Topset Southwest	0.0	0.0	5,219.5	4854.1	0.0	0.0	0.0	0.0	125.5
Beaufortian Lower Jurassic Topset	82.7	67.0	792.9	634.3	2.5	2.0	1.0	0.8	13.9
Beaufortian Clinoform	11.7	7.6	822.0	772.7	14.9	9.7	0.3	0.2	18.8
Brookian Topset Structural	137.1	135.7	10,605.7	10499.6	59.9	59.3	1.4	1.4	117.9
Torok Structural	34.7	34.3	17,905.5	17726.4	18.7	18.5	0.5	0.5	263.7
Ellesmerian Structural	0.0	0.0	1,990.1	1970.2	0.0	0.0	0.0	0.0	78.2
Thrust Belt	5.7	5.7	1,520.7	1505.5	4.0	3.9	0.1	0.1	49.3
Ellesmerian Ivishak	84.1	76.6	105.6	96.1	56.0	51.0	2.0	1.9	1.9
Ellesmerian Echooka North	6.9	5.8	7.3	6.1	4.8	4.0	0.2	0.1	0.1
Ellesmerian Echooka South	0.0	0.0	505.2	479.9	0.0	0.0	0.0	0.0	14.0
Ellesmerian Lisburne North	28.7	25.8	21.8	19.6	21.5	19.3	0.8	0.7	0.4
Ellesmerian Lisburne South	0.0	0.0	646.0	626.6	0.0	0.0	0.0	0.0	18.6
Ellesmerian Endicott North	2.5	1.8	1.1	0.8	1.6	1.1	0.1	0.0	0.0
Ellesmerian Endicott South	0.0	0.0	1,072.1	1018.5	0.0	0.0	0.0	0.0	38.9
Sum	10,558.3	9,305.5	61,350.7	59,668.0	11,684.9	10,313.6	219.7	194.4	1,206.7

table_32.xls

Table 33. Aggregate summary of in-place and technically recoverable resource estimates of the NPRA.

	<u>Volume of In-place resources</u>				<u>Volume of technically recoverable resources</u>			
	Means	Fractiles			Means	Fractiles		
		95	50	5		95	50	5
Oil in total assessment area	24,416	15,594	24,020	34,509	10,558	6,673	10,388	15,007
Oil in total Federal land	21,584	13,756	21,226	30,611	9,306	5,873	9,154	13,235
Non-associated gas in total assessment area	98,213	64,103	96,880	137,304	61,351	40,372	60,559	85,317
Non-associated gas in Federal land	95,607	62,115	94,271	134,023	59,668	39,071	58,880	83,208
NGL from ADG in total assessment area					1,426			
NGL from ADG in Federal land					1,367			
ADG in total assessment area					11,685			
ADG in Federal land					10,314			